

Exhibit T

GSM 04.08 V6.0.0 (1998-04)

Technical Specification

Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (GSM 04.08 version 6.0.0 Release 1997)

Approved by SMG as SMG version only, not for publication



Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

Reference

DTS/SMG-030408Q6 (8pc03003.PDF)

Keywords

Digital cellular telecommunications system,
Global System for Mobile communications (GSM)

ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
<http://www.etsi.fr>
<http://www.etsi.org>

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 1998.
All rights reserved.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

Contents

Intellectual Property Rights.....	26
Foreword	26
Introduction	26
0 Scope	27
0.1 Scope of the Technical Specification	27
0.2 Application to the interface structures	27
0.3 Structure of layer 3 procedures	27
0.4 Test procedures.....	27
0.5 Use of logical channels	28
0.6 Overview of control procedures.....	28
0.6.1 List of procedures.....	28
0.7 Applicability of implementations.....	30
0.7.1 Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS)	31
0.7.2 General Packet Radio Service (GPRS)	31
1 Normative references	31
2 Definitions and abbreviations	35
2.1 Random values.....	35
2.2 Vocabulary.....	35
3 Radio Resource management procedures	37
3.1 Overview/General	37
3.1.1 General.....	37
3.1.2 Services provided to upper layers	37
3.1.2.1 Idle mode.....	37
3.1.2.2 Dedicated mode.....	37
3.1.2.3 Group receive mode.....	38
3.1.2.4 Group transmit mode	38
3.1.2.5 Packet idle mode.....	38
3.1.2.6 Packet transfer mode	39
3.1.3 Services required from data link and physical layers	39
3.1.4 Change of dedicated channels	39
3.1.4.1 Change of dedicated channels using SAPI = 0	39
3.1.4.2 Change of dedicated channels using other SAPIs than 0.....	39
3.1.4.3 Sequenced message transfer operation	39
3.1.4.3.1 Variables and sequence numbers	40
3.1.4.3.1.2 Send sequence number N(SD)	40
3.1.4.3.2 Procedures for the initiation, transfer execution and termination of the sequenced message transfer operation	40
3.1.4.3.2.2 Transfer Execution.....	40
3.1.5 Procedure for Service Request and Contention Resolution.....	40
3.2 Idle mode and packet idle mode procedures	41
3.2.1 Mobile Station side	41
3.2.1.1 Mobile station supporting GPRS	41
3.2.2 Network side	42
3.2.2.1 System information broadcasting.....	42
3.2.2.2 Paging.....	43
3.3 RR connection establishment.....	43
3.3.1 RR connection establishment initiated by the mobile station	43
3.3.1.1 Entering the dedicated mode : immediate assignment procedure	43
3.3.1.1.1 Permission to access the network.....	44
3.3.1.1.2 Initiation of the immediate assignment procedure.....	44
3.3.1.1.3 Answer from the network.....	45
3.3.1.1.3.1 On receipt of a CHANNEL REQUEST message.....	45
3.3.1.1.3.2 Assignment rejection.....	46

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

3.3.1.1.4	Assignment completion.....	46
3.3.1.1.5	Abnormal cases.....	47
3.3.1.2	Entering the group transmit mode: uplink access procedure	47
3.3.1.2.1	Mobile station side.....	48
3.3.1.2.1.1	Uplink investigation procedure.....	48
3.3.1.2.1.2	Uplink access procedure	48
3.3.1.2.2	Network side	48
3.3.1.2.3	Abnormal cases.....	49
3.3.1.3	Dedicated mode and GPRS	49
3.3.2	Paging procedure for RR connection establishment.....	49
3.3.2.1	Paging initiation by the network.....	49
3.3.2.1.1	Paging initiation using paging subchannel on CCCH	49
3.3.2.1.2	Paging initiation using paging subchannel on PCCCH	51
3.3.2.1.3	Paging initiation using PACCH	51
3.3.2.2	Paging response.....	51
3.3.2.3	Abnormal cases.....	51
3.3.3	Notification procedure	52
3.3.3.1	Notification of a call.....	52
3.3.3.2	Joining a VGCS or VBS call	52
3.3.3.3	Reduced NCH monitoring mechanism	52
3.4	Procedures in dedicated mode and in group transmit mode.....	53
3.4.1	SACCH procedures.....	53
3.4.1.1	General	53
3.4.1.2	Measurement report.....	54
3.4.1.3	Extended measurement report \$(MAFA)\$	54
3.4.2	Transfer of messages and link layer service provision	55
3.4.3	Channel assignment procedure	55
3.4.3.1	Channel assignment initiation.....	55
3.4.3.2	Assignment completion	56
3.4.3.3	Abnormal cases.....	57
3.4.4	Handover procedure	57
3.4.4.1	Handover initiation.....	58
3.4.4.2	Physical channel establishment.....	59
3.4.4.2.1	Finely synchronized cell case.....	59
3.4.4.2.2	Non synchronized cell case	59
3.4.4.2.3	Pseudo-synchronized cell case.....	60
3.4.4.2.4	Pre-synchronized cell case	60
3.4.4.3	Handover completion	61
3.4.4.4	Abnormal cases.....	61
3.4.5	Frequency redefinition procedure.....	62
3.4.5.1	Abnormal cases.....	62
3.4.6	Channel mode modify procedure	62
3.4.6.1	Normal channel mode modify procedure.....	63
3.4.6.1.1	Initiation of the channel mode modify procedure	63
3.4.6.1.2	Completion of channel mode modify procedure	63
3.4.6.1.3	Abnormal cases.....	63
3.4.6.2	Channel mode modify procedure for a voice group call talker	63
3.4.6.2.1	Initiation of the channel mode modify procedure	63
3.4.6.2.2	Completion of mode change procedure.....	64
3.4.6.2.3	Abnormal cases.....	64
3.4.7	Ciphering mode setting procedure.....	64
3.4.7.1	Ciphering mode setting initiation.....	64
3.4.7.2	Ciphering mode setting completion.....	64
3.4.8	Additional channel assignment procedure.....	65
3.4.8.1	Additional assignment procedure initiation	65
3.4.8.2	Additional assignment procedure completion.....	65
3.4.8.3	Abnormal cases.....	65
3.4.9	Partial channel release procedure.....	65
3.4.9.1	Partial release procedure initiation	66
3.4.9.2	Abnormal cases.....	66

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

3.4.10	Classmark change procedure	66
3.4.11	Classmark interrogation procedure	66
3.4.11.1	Classmark interrogation initiation	66
3.4.11.2	Classmark interrogation completion	66
3.4.12	Indication of notifications and paging informations	66
3.4.13	RR connection release procedure	67
3.4.13.1	Normal release procedure	67
3.4.13.1.1	Channel release procedure initiation in dedicated mode and in group transmit mode	67
3.4.13.1.2	Abnormal cases	68
3.4.13.2	Radio link failure in dedicated mode	68
3.4.13.2.1	Mobile side	68
3.4.13.2.2	Network side	68
3.4.13.3	RR connection abortion in dedicated mode	69
3.4.13.4	Uplink release procedure in group transmit mode	69
3.4.14	Receiving a RR STATUS message by a RR entity.	69
3.4.15	Group receive mode procedures	69
3.4.15.1	Mobile station side	69
3.4.15.1.1	Reception of the VGCS or VBS channel	69
3.4.15.1.2	Monitoring of downlink messages and related procedures	69
3.4.15.1.2.1	Channel assignment procedure	70
3.4.15.1.2.2	Frequency redefinition procedure	70
3.4.15.1.2.3	Channel mode modify procedure	70
3.4.15.1.2.4	Notification and paging information	70
3.4.15.1.2.4.1	Use of Reduced NCH monitoring	70
3.4.15.1.2.5	Uplink status messages	71
3.4.15.1.2.6	Channel release message	71
3.4.15.1.2.7	Information on paging channel restructuring	71
3.4.15.1.3	Uplink reply procedure	71
3.4.15.1.4	Leaving the group receive mode	71
3.4.15.1.4.1	Returning to idle mode	71
3.4.15.1.4.2	Going to group transmit mode	71
3.4.15.2	Network side	72
3.4.15.2.1	Provision of messages on the VGCS or VBS channel downlink	72
3.4.15.2.1.1	General	72
3.4.15.2.1.2	Provision of general information messages	72
3.4.15.2.1.3	Provision of messages related to the voice group call uplink channel	72
3.4.15.2.2	Release of the VGCS or VBS Channels	73
3.4.15.3	Failure cases	73
3.4.16	Configuration change procedure	73
3.4.16.1	Configuration change initiation	73
3.4.16.2	Configuration change completion	73
3.4.16.3	Abnormal cases	73
3.4.17	Mapping of user data substreams onto timeslots in a multislot configuration	74
3.4.18	Handling of classmark information at band change	74
3.4.19	Assignment to a Packet Data channel	74
3.4.19.1	Assignment to PDCH initiation	75
3.4.19.2	Completion of the Assignment to PDCH procedure	76
3.4.19.3	Abnormal cases	76
3.4.20	RR-Network Commanded Cell Change Order	76
3.4.20.1	RR-network commanded cell change order initiation	77
3.4.20.2	Network controlled cell reselection completion	77
3.4.20.3	Abnormal cases	77
3.5	RR procedures on CCCH related to temporary block flow establishment	78
3.5.1	Packet paging procedure using CCCH	78
3.5.1.1	Packet paging initiation by the network	78
3.5.1.2	On receipt of a packet paging request	79
3.5.2	Packet access procedure using CCCH	79
3.5.2.1	Entering the packet transfer mode: packet access procedure	79
3.5.2.1.1	Permission to access the network	79
3.5.2.1.2	Initiation of the packet access procedure: channel request	79

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

3.5.2.1.3	Packet immediate assignment	80
3.5.2.1.3.1	On receipt of a CHANNEL REQUEST message.....	80
3.5.2.1.3.2	One phase packet access	80
3.5.2.1.3.3	Single block packet access.....	81
3.5.2.1.3.4	Packet access rejection.....	81
3.5.2.1.4	Packet access completion.....	82
3.5.2.1.5	Abnormal cases	82
3.5.3	Packet downlink assignment procedure using CCCH	82
3.5.3.1	Entering the packet transfer mode: packet downlink assignment procedure.....	82
3.5.3.1.2	Initiation of the packet downlink assignment procedure	82
3.5.3.1.3	Packet downlink assignment completion	83
3.5.3.1.4	Abnormal cases	83
4	Elementary procedures for Mobility Management	84
4.1.1	Type of MM and GMM procedures.....	84
4.1.2	MM sublayer states	85
4.1.2.1	MM sublayer states in the mobile station	85
4.1.2.1.1	Main states	86
4.1.2.1.2	Substates of the MM IDLE state.....	89
4.1.2.2	The update Status	90
4.1.2.3	MM sublayer states on the network side.....	91
4.1.3	GPRS mobility management (GMM) sublayer states.....	92
4.1.3.1	GMM states in the MS.....	92
4.1.3.1.1	Main states	92
4.1.3.1.1.1	GMM-NULL	92
4.1.3.1.1.2	GMM-DEREGISTERED.....	92
4.1.3.1.1.3	GMM-REGISTERED-INITIATED	92
4.1.3.1.1.4	GMM-REGISTERED	93
4.1.3.1.1.5	GMM-DEREGISTERED-INITIATED.....	93
4.1.3.1.1.6	GMM-ROUTING-AREA-UPDATING-INITIATED.....	93
4.1.3.1.2	Substates of state GMM-DEREGISTERED	93
4.1.3.1.2.1	GMM-DEREGISTERED.NORMAL-SERVICE	93
4.1.3.1.2.2	GMM-DEREGISTERED.LIMITED-SERVICE.....	93
4.1.3.1.2.3	GMM-DEREGISTERED.ATTACH-NEEDED.....	93
4.1.3.1.2.4	GMM-DEREGISTERED.ATTEMPTING-TO-ATTACH	93
4.1.3.1.2.5	GMM-DEREGISTERED.NO-IMSI.....	93
4.1.3.1.2.6	GMM-DEREGISTERED.NO-CELL-AVAILABLE	93
4.1.3.1.2.7	GMM-DEREGISTERED.PLMN-SEARCH	93
4.1.3.1.3	Substates of state GMM-REGISTERED	94
4.1.3.1.3.1	GMM-REGISTERED.NORMAL-SERVICE	94
4.1.3.1.3.2	GMM-REGISTERED.SUSPENDED	94
4.1.3.1.3.3	GMM-REGISTERED.UPDATE-NEEDED	94
4.1.3.1.3.4	GMM-REGISTERED.ATTEMPTING-TO-UPDATE	94
4.1.3.1.3.5	GMM-REGISTERED.NO-CELL-AVAILABLE.....	94
4.1.3.2	GPRS update status	95
4.1.3.3	GMM mobility management states on the network side.....	96
4.1.3.3.1	Main States	96
4.1.3.3.1.1	GMM-DEREGISTERED.....	96
4.1.3.3.1.2	GMM-COMMON-PROCEDURE-INITIATED	96
4.1.3.3.1.3	GMM-REGISTERED	96
4.1.3.3.1.4	GMM-DEREGISTERED-INITIATED.....	96
4.1.3.3.2	Substates of state GMM-REGISTERED	97
4.1.3.3.2.1	GMM-REGISTERED.NORMAL-SERVICE	97
4.1.3.3.2.2	GMM-REGISTERED.SUSPENDED	97
4.2	Behaviour of the MS in MM Idle state, GMM-DEREGISTERED state and GMM-REGISTERED state	97
4.2.1	Primary Service State selection.....	98
4.2.1.1	Selection of the Service State after Power On	98
4.2.1.2	Other Cases.....	98
4.2.2	Detailed Description of the MS behaviour in MM IDLE State	99
4.2.2.1	Service State, NORMAL SERVICE.....	99

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

4.2.2.2	Service State, ATTEMPTING TO UPDATE.....	99
4.2.2.3	Service State, LIMITED SERVICE	100
4.2.2.4	Service State, NO IMSI	100
4.2.2.5	Service State, SEARCH FOR PLMN, NORMAL SERVICE	101
4.2.2.6	Service State, SEARCH FOR PLMN	101
4.2.2.7	Service State, RECEIVING GROUP CALL (NORMAL SERVICE)	101
4.2.2.8	Service State, RECEIVING GROUP CALL (LIMITED SERVICE).....	102
4.2.3	Service state when back to state MM IDLE from another state	102
4.2.4	Behaviour in state GMM-DEREGISTERED	103
4.2.4.1	Primary substate selection	103
4.2.4.1.1	Selection of the substate after power on or enabling the MS's GPRS capability	103
4.2.4.1.2	Other Cases	104
4.2.4.2	Detailed description of the MS behaviour in state GMM-DEREGISTERED	104
4.2.4.2.1	Substate, NORMAL-SERVICE	104
4.2.4.2.2	Substate, ATTEMPTING-TO-ATTACH	104
4.2.4.2.3	Substate, LIMITED-SERVICE.....	104
4.2.4.2.4	Substate, NO-IMSI	104
4.2.4.2.5	Substate, NO-CELL	104
4.2.4.2.6	Substate, PLMN-SEARCH	104
4.2.4.2.7	Substate, ATTACH-NEEDED.....	105
4.2.4.3	Substate when back to state GMM-DEREGISTERED from another GMM state.....	105
4.3	MM common procedures.....	105
4.3.1	TMSI reallocation procedure	105
4.3.1.1	TMSI reallocation initiation by the network.....	106
4.3.1.2	TMSI reallocation completion by the mobile station.....	106
4.3.1.3	TMSI reallocation completion in the network	106
4.3.1.4	Abnormal cases.....	106
4.3.2	Authentication procedure	107
4.3.2.1	Authentication request by the network	107
4.3.2.2	Authentication response by the mobile station	107
4.3.2.3	Authentication processing in the network	107
4.3.2.4	Ciphering key sequence number.....	107
4.3.2.5	Unsuccessful authentication.....	108
4.3.2.6	Abnormal cases.....	108
4.3.3	Identification procedure	109
4.3.3.1	Identity request by the network.....	109
4.3.3.2	Identification response by the mobile station.....	109
4.3.3.3	Abnormal cases.....	109
4.3.4	IMSI detach procedure.....	110
4.3.4.1	IMSI detach initiation by the mobile station.....	110
4.3.4.2	IMSI detach procedure in the network.....	110
4.3.4.3	IMSI detach completion by the mobile station	110
4.3.4.4	Abnormal cases.....	110
4.3.5	Abort procedure	110
4.3.5.1	Abort procedure initiation by the network.....	111
4.3.5.2	Abort procedure in the mobile station	111
4.3.6	MM information procedure.....	111
4.3.6.1	MM information procedure initiation by the network.....	111
4.3.6.2	MM information procedure in the mobile station	111
4.4	MM specific procedures	111
4.4.1	Location updating procedure.....	112
4.4.2	Periodic updating	112
4.4.3	IMSI attach procedure.....	113
4.4.4	Generic Location Updating procedure	114
4.4.4.1	Location updating initiation by the mobile station.....	114
4.4.4.1a	Network Request for Additional mobile station Capability Information	114
4.4.4.2	Identification request from the network	114
4.4.4.3	Authentication by the network.....	114
4.4.4.4	Ciphering mode setting by the network	114
4.4.4.5	Attempt Counter	114

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

4.4.4.6	Location updating accepted by the network.....	115
4.4.4.7	Location updating not accepted by the network	115
4.4.4.8	Release of RR connection after location updating.....	116
4.4.4.9	Abnormal cases on the mobile station side.....	116
4.4.4.10	Abnormal cases on the network side.....	117
4.5	Connection management sublayer service provision	118
4.5.1	MM connection establishment	118
4.5.1.1	MM connection establishment initiated by the mobile station	118
4.5.1.2	Abnormal cases.....	120
4.5.1.3	MM connection establishment initiated by the network	121
4.5.1.3.1	Mobile Terminating CM Activity	121
4.5.1.3.2	Mobile Originating CM Activity \$(CCBS)\$	122
4.5.1.4	Abnormal cases.....	123
4.5.1.5	MM connection establishment for emergency calls.....	123
4.5.1.6	Call re-establishment	123
4.5.1.6.1	Call re-establishment, initiation by the mobile station	124
4.5.1.6.2	Abnormal cases	125
4.5.1.7	Forced release during MO MM connection establishment	126
4.5.2	MM connection information transfer phase	126
4.5.2.1	Sending CM messages	126
4.5.2.2	Receiving CM messages.....	127
4.5.2.3	Abnormal cases.....	127
4.5.3	MM connection release	127
4.5.3.1	Release of associated RR connection	127
4.5.3.2	Uplink release in a voice group call.....	127
4.6	Receiving a MM STATUS message by a MM entity	127
4.7	Elementary mobility management procedures for GPRS services	128
4.7.1	General.....	128
4.7.1.1	Lower layer failure	128
4.7.1.2	Ciphering of messages	128
4.7.2	GPRS Mobility management timers.....	128
4.7.2.1	READY and STANDBY timer behaviour.....	128
4.7.2.2	Periodic routing area updating.....	129
4.7.3	GPRS attach procedure	130
4.7.3.1	GPRS attach procedure for GPRS services	130
4.7.3.1.1	GPRS attach procedure initiation.....	130
4.7.3.1.2	GMM common procedure initiation	131
4.7.3.1.3	GPRS attach accepted by the network	131
4.7.3.1.4	GPRS attach not accepted by the network	131
4.7.3.1.5	Abnormal cases in the MS	132
4.7.3.1.6	Abnormal cases on the network side.....	133
4.7.3.2	Combined GPRS attach procedure for GPRS and non-GPRS services	134
4.7.3.2.1	Combined GPRS attach procedure initiation	134
4.7.3.2.2	GMM Common procedure initiation.....	134
4.7.3.2.3	Combined GPRS attach accepted by the network	134
4.7.3.2.4	Combined GPRS attach not accepted by the network.....	135
4.7.3.2.5	Abnormal cases in the MS	136
4.7.3.2.6	Abnormal cases on the network side	136
4.7.4	GPRS detach procedure	137
4.7.4.1	MS initiated GPRS detach procedure	137
4.7.4.1.1	MS initiated GPRS detach procedure initiation	137
4.7.4.1.2	MS initiated GPRS detach procedure completion for GPRS services only	137
4.7.4.1.3	MS initiated combined GPRS detach procedure completion	138
4.7.4.1.4	Abnormal cases in the MS	138
4.7.4.2	Network initiated GPRS detach procedure.....	139
4.7.4.2.1	Network initiated GPRS detach procedure initiation	139
4.7.4.2.2	Network initiated GPRS detach procedure completion.....	139
4.7.4.2.3	Abnormal cases on the network side	139
4.7.5	Routing area updating procedure	140
4.7.5.1	Normal and periodic routing area updating procedure	141

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

4.7.5.1.1	Normal and periodic routing area updating procedure initiation	141
4.7.5.1.2	GMM Common procedure initiation.....	141
4.7.5.1.3	Normal and periodic routing area updating procedure accepted by the network	141
4.7.5.1.4	Normal and periodic routing area updating procedure not accepted by the network	142
4.7.5.1.5	Abnormal cases in the MS	142
4.7.5.1.6	Abnormal cases on the network side	143
4.7.5.2	Combined routing area updating procedure.....	144
4.7.5.2.1	Combined routing area updating procedure initiation.....	144
The	combined routing area updating procedure is initiated only if the MS is in state GMM-REGISTERED and if the network operates in network operation mode I:	144
4.7.5.2.2	GMM Common procedure initiation.....	145
4.7.5.2.3	Combined routing area updating procedure accepted by the network.....	145
4.7.5.2.4	Combined routing area updating not accepted by the network	146
4.7.5.2.5	Abnormal cases in the MS	146
4.7.5.2.6	Abnormal cases on the network side	147
4.7.6	P-TMSI reallocation procedure.....	147
4.7.6.1	P-TMSI reallocation initiation by the network	147
4.7.6.2	P-TMSI reallocation completion by the MS.....	147
4.7.6.3	P-TMSI reallocation completion by the network.....	147
4.7.6.4	Abnormal cases in the MS	147
4.7.6.5	Abnormal cases on the network side.....	148
4.7.7	Authentication and ciphering procedure.....	148
4.7.7.1	Authentication and ciphering initiation by the network	149
4.7.7.2	Authentication and ciphering response by the MS.....	149
4.7.7.3	Authentication and ciphering completion by the network.....	149
4.7.7.4	GPRS ciphering key sequence number	149
4.7.7.5	Unsuccessful authentication and ciphering.....	150
4.7.7.6	Abnormal cases on the network side.....	150
4.7.8	Identification procedure	151
4.7.8.1	Identification initiation by the network.....	151
4.7.8.2	Identification response by the MS	151
4.7.8.3	Identification completion by the network	151
4.7.8.4	Abnormal cases on the network side.....	151
4.7.9	Paging procedure.....	152
4.7.9.1	Paging for GPRS services.....	152
4.7.9.2	Paging for non-GPRS services	152
4.7.10	Receiving a GMM STATUS message by a GMM entity	152
4.7.11	GMM support for anonymous access	152
4.7.11.1	MS side.....	153
4.7.11.2	Network side.....	153
4.7.12	GMM Information procedure.....	153
4.7.12.1	GMM information procedure initiation by the network.....	153
4.7.12.2	GMM information procedure in the mobile station	153
5	Elementary procedures for circuit-switched Call Control	153
5.1	Overview.....	153
5.1.1	General.....	153
5.1.2	Call Control States	158
5.1.2.1	Call states at the mobile station side of the interface	158
5.1.2.1.1	Null (State U0)	158
5.1.2.1.2	MM Connection pending (U0.1).....	159
5.1.2.1.2a	CC prompt present (U0.2) \$(CCBS)\$	159
5.1.2.1.2b	Wait for network information (U0.3) \$(CCBS)\$	159
5.1.2.1.2c	CC-Establishmentpresent (U0.4) \$(CCBS)\$.....	159
5.1.2.1.2d	CC-Establishment confirmed (U0.5) \$(CCBS)\$.....	159
5.1.2.1.2e	Recall present (U0.6) \$(CCBS)\$	159
5.1.2.1.3	Call initiated (U1)	159
5.1.2.1.4	Mobile originating call proceeding (U3).....	159
5.1.2.1.5	Call delivered (U4)	159
5.1.2.1.6	Call present (U6).....	159
5.1.2.1.7	Call received (U7).....	159

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.1.2.1.8	Connect Request (U8).....	160
5.1.2.1.9	Mobile terminating call confirmed (U9)	160
5.1.2.1.10	Active (U10)	160
5.1.2.1.11	Disconnect request (U11).....	160
5.1.2.1.12	Disconnect indication (U12).....	160
5.1.2.1.13	Release request (U19)	160
5.1.2.1.14	Mobile originating modify (U26).....	160
5.1.2.1.15	Mobile terminating modify (U27).....	160
5.1.2.2	Network call states.....	160
5.1.2.2.1	Null (State N0).....	160
5.1.2.2.2	MM connection pending (N0.1).....	160
5.1.2.2.2a	CC connection pending (N0.2) \$(CCBS)\$.....	160
5.1.2.2.2b	Network answer pending (N0.3) \$(CCBS)\$	161
5.1.2.2.2c	CC-Establishment present (N0.4) \$(CCBS)\$.....	161
5.1.2.2.2d	CC-Establishment confirmed (N0.5) \$(CCBS)\$.....	161
5.1.2.2.3	Call initiated (N1)	161
5.1.2.2.4	Mobile originating call proceeding (N3).....	161
5.1.2.2.5	Call delivered (N4)	161
5.1.2.2.6	Call present (N6).....	161
5.1.2.2.7	Call received (N7).....	161
5.1.2.2.8	Connect request (N8)	161
5.1.2.2.9	Mobile terminating call confirmed (N9)	161
5.1.2.2.10	Active (N10)	161
5.1.2.2.11	{Not used}	162
5.1.2.2.12	Disconnect indication (N12).....	162
5.1.2.2.13	Release request (N19).....	162
5.1.2.2.14	Mobile originating modify (N26).....	162
5.1.2.2.15	Mobile terminating modify (N27)	162
5.1.2.2.16	Connect Indication (N28).....	162
5.2	Call establishment procedures	162
5.2.1	Mobile originating call establishment	162
5.2.1.1	Call initiation	163
5.2.1.2	Receipt of a setup message	163
5.2.1.3	Receipt of a CALL PROCEEDING message	164
5.2.1.4	Notification of progressing mobile originated call	165
5.2.1.4.1	Notification of interworking in connection with mobile originated call establishment	165
5.2.1.4.2	Call progress in the PLMN/ISDN environment	165
5.2.1.5	Alerting.....	166
5.2.1.6	Call connected	166
5.2.1.7	Call rejection	167
5.2.1.8	Transit network selection.....	167
5.2.1.9	Traffic channel assignment at mobile originating call establishment.....	167
5.2.1.10	Call queuing at mobile originating call establishment	167
5.2.2	Mobile terminating call establishment.....	167
5.2.2.1	Call indication	168
5.2.2.2	Compatibility checking.....	168
5.2.2.3	Call confirmation	168
5.2.2.3.1	Response to SETUP	168
5.2.2.3.2	Receipt of CALL CONFIRMED and ALERTING by the network	169
5.2.2.3.3	Call failure procedures.....	169
5.2.2.3.4	Called mobile station clearing during mobile terminating call establishment	169
5.2.2.4	Notification of interworking in connection with mobile terminating call establishment.....	170
5.2.2.5	Call accept	170
5.2.2.6	Active indication.....	170
5.2.2.7	Traffic channel assignment at mobile terminating call establishment.....	170
5.2.2.8	Call queuing at mobile terminating call establishment	171
5.2.2.9	User connection attachment during a mobile terminating call	171
5.2.3	Network initiated MO call \$(CCBS)\$	171
5.2.3.1	Initiation.....	171
5.2.3.2	CC-Establishment present	171

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.3.2.1	Recall Alignment Procedure	173
5.2.3.4	Recall present	174
5.2.3.5	Traffic channel assignment during network initiated mobile originating call establishment	175
5.3	Signalling procedures during the "active" state	175
5.3.1	User notification procedure	175
5.3.2	Call rearrangements	175
5.3.3	Not used	175
5.3.4	Support of Dual Services	175
5.3.4.1	Service Description	175+176
5.3.4.2	Call establishment	176
5.3.4.2.1	Mobile Originating Establishment	176
5.3.4.2.2	Mobile Terminating Establishment	177
5.3.4.3	Changing the Call Mode	177
5.3.4.3.1	Initiation of in-call modification	177
5.3.4.3.2	Successful completion of in-call modification	177+178
5.3.4.3.3	Change of the channel configuration	178
5.3.4.3.4	Failure of in-call modification	178
5.3.4.3.4.1	Network rejection of in-call modification	178
5.3.4.3.4.2	Mobile station rejection of in-call modification	178
5.3.4.3.4.3	Time-out recovery	178
5.3.4.4	Abnormal procedures	178+179
5.3.5	User initiated service level up- and downgrading	179
5.3.5.1	Initiation of service level up- and downgrading	179
5.3.5.2	Successful completion of service level up- and downgrading	179+180
5.3.5.3	Rejection of service level up- and downgrading	180
5.3.5.4	Time-out recovery	180
5.4	Call clearing	180
5.4.1	Terminology	180
5.4.2	Exception conditions	180
5.4.3	Clearing initiated by the mobile station	181
5.4.3.1	Initiation of call clearing	181
5.4.3.2	Receipt of a DISCONNECT message from the mobile station	181
5.4.3.3	Receipt of a RELEASE message from the network	181
5.4.3.4	Receipt of a RELEASE COMPLETE message from the mobile station	181+182
5.4.3.5	Abnormal cases	181+182
5.4.4	Clearing initiated by the network	182
5.4.4.1	Clearing when tones/announcements provided	182
5.4.4.1.1	Receipt of a DISCONNECT message with progress indicator #8 from the network	182
5.4.4.1.2	Expiry of timer T306	182
5.4.4.2	Clearing when tones/announcements not provided	182
5.4.4.2.1	Receipt of a DISCONNECT message without progress indicator or with progress indicator different from #8 from the network	182+183
5.4.4.2.2	Receipt of a RELEASE message from the mobile station	183
5.4.4.2.3	Abnormal cases	183
5.4.4.3	Completion of clearing	183
5.4.4.3.1	Abnormal cases	183
5.4.5	Clear collision	183
5.5	Miscellaneous procedures	183+184
5.5.1	In-band tones and announcements	183+184
5.5.2	Call collisions	184
5.5.3	Status procedures	184
5.5.3.1	Status enquiry procedure	184
5.5.3.2	Reception of a STATUS message by a CC entity	184+185
5.5.3.2.1	STATUS message with incompatible state	184+185
5.5.3.2.2	STATUS message with compatible state	184+185
5.5.4	Call re-establishment, mobile station side	185
5.5.4.1	Indication from the mobility management sublayer	185
5.5.4.2	Reaction of call control	185
5.5.4.3	Completion of re-establishment	185
5.5.4.4	Unsuccessful outcome	185+186

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.5.5	Call re-establishment, network side.....	185186
5.5.5.1	State alignment	185186
5.5.6	Progress.....	185186
5.5.7	DTMF protocol control procedure	186
5.5.7.1	Start DTMF request by the mobile station.....	186
5.5.7.2	Start DTMF response by the network.....	186187
5.5.7.3	Stop DTMF request by the mobile station.....	186187
5.5.7.4	Stop DTMF response by the network	186187
5.5.7.5	Sequencing of subsequent start DTMF requests by the mobile station.....	187
6	Support for packet services.....	187188
6.1	GPRS Session management.....	188
6.1.1	General.....	188
6.1.2	Session management states.....	188
6.1.2.1	Session management states in the MS	188
6.1.2.1.1	PDP-INACTIVE	188
6.1.2.1.2	PDP-ACTIVE-PEND	188189
6.1.2.1.3	PDP-INACTIVE-PEND	188189
6.1.2.1.4	PDP-ACTIVE	188189
6.1.2.2	Session management states on the network side	189
6.1.2.2.1	PDP-INACTIVE	189
6.1.2.2.2	PDP-ACTIVE-PEND	189
6.1.2.2.3	PDP-INACTIVE-PEND	189190
6.1.2.2.4	PDP-ACTIVE	189190
6.1.2.2.5	PDP-MODIFY-PEND	189190
6.1.3	Session Management procedures	190
6.1.3.1	PDP context activation	190
6.1.3.1.1	Successful PDP context activation initiated by the mobile station.....	190
6.1.3.1.2	Successful PDP context activation requested by the network	191
6.1.3.1.3	Unsuccessful PDP context activation initiated by the MS	191
6.1.3.1.4	Unsuccessful PDP context activation requested by the network	191
6.1.3.1.5	Abnormal cases	191
6.1.3.2	PDP context modification procedure.....	193
6.1.3.2.1	Abnormal cases	193
6.1.3.3	PDP context deactivation procedure.....	194
6.1.3.3.1	PDP context deactivation initiated by the MS.....	194
6.1.3.3.2	PDP context deactivation initiated by the network	194
6.1.3.3.3	Abnormal cases	194
6.1.3.4	AA PDP context activation.....	195
6.1.3.4.1	Successful AA PDP context activation initiated by the mobile station	195
6.1.3.4.2	Unsuccessful AA PDP context activation	195
6.1.3.4.3	Abnormal cases	196
6.1.3.5	AA PDP context deactivation	196
6.1.3.5.1	Implicit AA PDP context deactivation.....	196
6.1.3.5.2	Explicit AA PDP context deactivation.....	196
6.1.3.5.3	Abnormal cases	197
7.1	General.....	197
7.1.1	Paging request	198
7.1.2	Immediate assignment	198
7.1.3	Service request and contention resolution	198
7.1.4	Authentication	199
7.1.5	Ciphering mode setting	199
7.1.6	Transaction phase.....	199
7.1.6.1	Channel mode modify.....	199
7.1.7	Channel release	200
7.2	Abnormal cases.....	200
7.3	Selected examples.....	200
7.3.1	Location updating.....	201225
7.3.2	Mobile originating call establishment	202226
7.3.3	Mobile terminating call establishment.....	206229
7.3.4	Call clearing	208231

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

7.3.5	DTMF protocol control.....	209232
7.3.6	Handover.....	210233
7.3.7	In-call modification.....	211234
7.3.8	Call re-establishment.....	212235
7.3.9	Network initiated mobile originating call \$(CCBS)\$.....	213236
8	Handling of unknown, unforeseen, and erroneous protocol data.....	218241
8.1	General.....	218241
8.2	Message too short.....	218241
8.3	Unknown or unforeseen transaction identifier.....	218241
8.4	Unknown or unforeseen message type.....	219242
8.5	Non-semantic mandatory information element errors.....	220243
8.5.1	Radio resource management.....	220243
8.5.2	Mobility management.....	220243
8.5.3	Call control.....	220243
8.5.4	Session management.....	221244
8.6	Unknown and unforeseen IEs in the non-imperative message part.....	221244
8.6.1	IEs unknown in the message.....	221244
8.6.2	Out of sequence IEs.....	221244
8.6.3	Repeated IEs.....	221244
8.7	Non-imperative message part errors.....	221244
8.7.1	Syntactically incorrect optional IEs.....	222245
8.7.2	Conditional IE errors.....	222245
8.8	Messages with semantically incorrect contents.....	222245
9	Message functional definitions and contents.....	222245
9.1	Messages for Radio Resources management.....	223246
9.1.1	Additional assignment.....	225248
9.1.1.1	Mobile Allocation.....	225248
9.1.1.2	Starting Time.....	225248
9.1.2	Assignment command.....	225248
9.1.2.1	Mode of the First Channel (Channel Set 1) and Mode of Channel Set "X" (2=<X=<8).....	226249
9.1.2.2	Description of the Second Channel.....	227250
9.1.2.3	Mode of the Second Channel.....	227250
9.1.2.4	Mobile Allocation and Frequency List, after the starting time.....	227250
9.1.2.5	Starting Time.....	227250
9.1.2.6	Reference cell frequency list.....	228251
9.1.2.7	Cell Channel Description.....	228251
9.1.2.8	Cipher Mode Setting.....	228251
9.1.2.9	VGCS target mode Indication.....	228251
9.1.2.10	Description of the multislot allocation.....	228251
9.1.3	Assignment complete.....	229252
9.1.4	Assignment failure.....	229252
9.1.5	Channel mode modify.....	229252
9.1.5.1	Channel Description.....	230253
9.1.5.2	VGCS target mode Indication.....	230253
9.1.6	Channel mode modify acknowledge.....	230253
9.1.7	Channel release.....	230253
9.1.7.1	Channel description and mobile allocation.....	231254
9.1.7.2	Group Cipher Key Number.....	231254
9.1.8	Channel request.....	231254
9.1.9	Ciphering mode command.....	233256
9.1.10	Ciphering mode complete.....	233256
9.1.10.1	Mobile Equipment Identity.....	234257
9.1.11	Classmark change.....	234257
9.1.11.1	Additional Mobile Station Classmark Information.....	234257
9.1.11.2	Mobile Station Classmark.....	234257
9.1.12	Classmark enquiry.....	234257
9.1.12a	[Spare].....	235258
9.1.12b	Configuration change command.....	235258
9.1.12b.1	Description of the multislot allocation.....	235258

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.1.12b.2	Mode of Channel Set "X" (1= $X \leq 8$)	236258
9.1.12c	Configuration change acknowledge	236259
9.1.12d	Configuration change reject	236259
9.1.13	Frequency redefinition	236259
9.1.13.1	Cell Channel Description	237260
9.1.13a	PDCH Assignment command	237260
9.1.13a.1	Mobile Allocation and Frequency List, after the starting time	238261
9.1.13a.2	Starting Time	238261
9.1.13a.3	Reference cell frequency list	238261
9.1.13a.4	Cell Channel Description	239261
9.1.13a.5	Packet Assignment	239262
9.1.14	Handover access	239262
9.1.15	Handover command	239262
9.1.15.1	Synchronization Indication	241263
9.1.15.2	Mode of the First Channel (Channel Set 1) and Mode of Channel Set "X" (2= $X \leq 8$)	241264
9.1.15.3	Description of the Second Channel	241264
9.1.15.4	Mode of the Second Channel	241264
9.1.15.5	Frequency Channel Sequence, Frequency List, Frequency short list and Mobile Allocation, after time	241264
9.1.15.6	Starting Time	242264
9.1.15.7	Reference cell frequency list	242265
9.1.15.8	Real Time Difference	242265
9.1.15.9	Timing Advance	242265
9.1.15.10	Cipher Mode Setting	243265
9.1.15.11	VGCS target mode indication	243266
9.1.15.12	Description of the multislot allocation	243266
9.1.16	Handover complete	243266
9.1.16.1	Mobile Observed Time Difference	244267
9.1.17	Handover failure	244267
9.1.18	Immediate assignment	244267
9.1.18.0a	Packet Response Type	245268
9.1.18.0b	Channel Description	245268
9.1.18.0c	Packet Channel Description	245268
9.1.18.0d	Request Reference	245268
9.1.18.1	Mobile Allocation	245268
9.1.18.2	Starting Time	245268
9.1.18.3	IA Rest Octets (Frequency parameters, before time)	246268
9.1.18.4	IA Rest Octets (Packet Immediate Assignment or Packet Downlink Assignment)	246269
9.1.19	Immediate assignment extended	246269
9.1.19.1	Unnecessary IEs	247270
9.1.19.2	Mobile Allocation	247270
9.1.19.3	Starting Time	247270
9.1.19.4	Maximum message length	247270
9.1.19.5	IAX Rest Octets	247270
9.1.20	Immediate assignment reject	247270
9.1.20.1	Use of the indexes	248271
9.1.20.2	Filling of the message	248271
9.1.20.3	IAR Rest Octets	248271
9.1.21	Measurement report	248271
9.1.21a	Notification/FACCH	249272
9.1.21a.1	VBS/VGCS Channel description	250273
9.1.21a.2	PCH information	250273
9.1.21a.3	Paging Information	250273
9.1.21a.4	Composition of the optional information elements	250273
9.1.21b	Notification/NCH	250273
9.1.21b.1	Group Channel Description	251274
9.1.21b.2	NT/N Rest Octets	251274
9.1.21d	Notification response	251274
9.1.21e	RR-Cell Change Order	252275
9.1.22	Paging request type 1	252275

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.1.22.1	Unnecessary IE	253276
9.1.22.2	Channels needed for Mobiles 1 and 2	253276
9.1.22.3	Mobile Identities	253276
9.1.22.4	P1 Rest Octets	253276
9.1.23	Paging request type 2	253276
9.1.23.1	Channels needed for Mobiles 1 and 2	254277
9.1.23.2	Mobile Identity 3	254277
9.1.23.3	P2 Rest Octets	254277
9.1.24	Paging request type 3	254277
9.1.24.1	Channels needed for Mobiles 1 and 2	255278
9.1.24.2	P3 Rest Octets	255278
9.1.25	Paging response	255278
9.1.25.1	Mobile Station Classmark	256278
9.1.26	Partial release	256279
9.1.26.1	Channel Description	256279
9.1.27	Partial release complete	256279
9.1.28	Physical information	256279
9.1.28.a	RR Initialisation Request	257280
9.1.29	RR Status	257280
9.1.30	Synchronization channel information	258281
9.1.31	System information Type 1	258281
9.1.32	System information type 2	259282
9.1.33	System information type 2bis	259282
9.1.34	System information type 2ter	260283
9.1.35	System information type 3	261283
9.1.36	System information type 4	261284
9.1.36.1	CBCCH Channel description	262285
9.1.36.2	CBCCH Mobile Allocation	262285
9.1.36.3	SI 4 Rest Octets	262285
9.1.37	System information type 5	262285
9.1.38	System information type 5bis	263285
9.1.39	System information type 5ter	263286
9.1.40	System information type 6	264286
9.1.40.1	Cell Identity	264287
9.1.40.2	Location Area Identification	264287
9.1.40.3	Cell Options	264287
9.1.40.4	NCC permitted	264287
9.1.41	System information type 7	265287
9.1.42	System information type 8	265288
9.1.43	System information Type 9	265288
9.1.43a	System information Type 13	266288
9.1.43b	System Information Type 14	266289
9.1.43b.1	SI 14 Rest Octets	267289
9.1.43b.2	Reference frequency list	267290
9.1.43b.3	Mobile Allocation	267290
9.1.43c	System information Type 15	268290
9.1.43c.1	SI 15 Rest Octets	268291
9.1.44	Talker indication	268291
9.1.45	Uplink access	269291
9.1.46	Uplink busy	269292
9.1.47	Uplink free	270292
9.1.48	Uplink release	271293
9.1.49	VGCS uplink grant	271293
9.1.50	System information type 10 \$(ASCI)\$	271295
9.1.51	EXTENDED MEASUREMENT ORDER \$(MAFA)\$	272295
9.1.52	Extended measurement report \$(MAFA)\$	272296
9.2	Messages for mobility management	273296
9.2.1	Authentication reject	274297
9.2.2	Authentication request	274298
9.2.3	Authentication response	274298

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.2.4	CM Re-establishment request.....	275298
9.2.4.1	Location area identification	275299
9.2.4.2	Mobile Station Classmark.....	275299
9.2.5	CM service accept.....	275299
9.2.5a	CM service prompt \$(CCBS)\$	276299
9.2.6	CM service reject	276301
9.2.7	CM service abort.....	277301
9.2.8	Abort.....	277301
9.2.9	CM service request.....	277302
9.2.9.1	Mobile Station Classmark.....	278302
9.2.9.2	Priority.....	278302
9.2.10	Identity request.....	278302
9.2.11	Identity response	279303
9.2.12	IMSI detach indication	279304
9.2.12.1	Mobile Station Classmark.....	279304
9.2.13	Location updating accept	279304
9.2.13.1	Follow on proceed	280304
9.2.14	Location updating reject.....	280305
9.2.15	Location updating request	280305
9.2.15.1	Location area identification	281305
9.2.15.2	Mobile Station Classmark.....	281305
9.2.15a	MM information.....	281306
9.2.15a.1	Full name for network.....	282306
9.2.15a.2	Short name for network	282306
9.2.15a.3	Network time zone	282306
9.2.15a.4	Network time zone and time	282306
9.2.16	MM Status.....	282306
9.2.17	TMSI reallocation command.....	282307
9.2.18	TMSI reallocation complete	283307
9.2.19	MM Null	283307
9.3	Messages for circuit-switched call control.....	283308
9.3.1	Alerting	284309
9.3.1.1	Alerting (network to mobile station direction).....	284309
9.3.1.1.1	Facility	285310
9.3.1.1.2	Progress indicator	285310
9.3.1.1.3	User-user.....	285310
9.3.1.2	Alerting (mobile station to network direction).....	285310
9.3.1.2.1	Facility	286311
9.3.1.2.2	User-user.....	286311
9.3.1.2.3	SS version	286311
9.3.2	Call confirmed.....	286311
9.3.2.1	Repeat indicator.....	286311
9.3.2.2	Bearer capability 1 and bearer capability 2	287311
9.3.2.3	Cause	287312
9.3.2.4	CC Capabilities.....	287312
9.3.3	Call proceeding	287312
9.3.3.1	Repeat indicator.....	288313
9.3.3.2	Bearer capability 1 and bearer capability 2	288313
9.3.3.3	Facility.....	288313
9.3.3.4	Progress Indicator.....	288313
9.3.3.5	Priority granted.....	288313
9.3.4	Congestion control	288313
9.3.4.1	Cause	289314
9.3.5	Connect	289314
9.3.5.1	Connect (network to mobile station direction).....	289314
9.3.5.1.1	Facility	289314
9.3.5.1.2	Progress indicator	289314
9.3.5.1.3	User-user.....	290314
9.3.5.2	Connect (mobile station to network direction).....	290314
9.3.5.2.1	Facility	290315

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.3.5.2.2	User-user	290315
9.3.5.2.3	SS version	290315
9.3.6	Connect acknowledge.....	290315
9.3.7	Disconnect.....	291316
9.3.7.1	Disconnect (network to mobile station direction)	291316
9.3.7.1.1	Facility	291316
9.3.7.1.2	Progress indicator	291316
9.3.7.1.3	User-user	291316
9.3.7.2	Disconnect (mobile station to network direction)	292317
9.3.7.2.1	Facility	292317
9.3.7.2.2	User-user	292317
9.3.7.2.3	SS version	292317
9.3.8	Emergency setup	292317
9.3.8.1	Bearer capability	293318
9.3.9	Facility	293318
9.3.9.1	Facility (network to mobile station direction)	293318
9.3.9.2	Facility (mobile station to network direction)	293318
9.3.9.2.1	SS version	294319
9.3.10	Hold.....	294319
9.3.11	Hold Acknowledge.....	294319
9.3.12	Hold Reject	295319
9.3.13	Modify.....	295320
9.3.13.1	Low layer compatibility	296320
9.3.13.2	High layer compatibility	296320
9.3.13.3	Reverse call setup direction	296320
9.3.14	Modify complete	296321
9.3.14.1	Low layer compatibility	296321
9.3.14.2	High layer compatibility	296321
9.3.14.3	Reverse call setup direction	296321
9.3.15	Modify reject.....	297322
9.3.15.1	Low layer compatibility	297322
9.3.15.2	High layer compatibility	297322
9.3.16	Notify	297322
9.3.17	Progress.....	298323
9.3.17.1	User-user.....	298323
9.3.17a	CC-Establishment \$(CCBS)\$	299323
9.3.17a.2	Setup container	299323
9.3.17b	CC-Establishment confirmed \$(CCBS)\$	299323
9.3.17b.1	Repeat indicator.....	299324
9.3.17b.2	Bearer capability 1 and bearer capability 2	299324
9.3.17b.9	Cause	299324
9.3.18	Release	300324
9.3.18.1	Release (network to mobile station direction)	300324
9.3.18.1.1	Cause.....	300325
9.3.18.1.2	Second cause	300325
9.3.18.1.3	Facility	300325
9.3.18.1.4	User-user	300325
9.3.18.2	Release (mobile station to network direction)	300325
9.3.18.2.1	Cause.....	301326
9.3.18.2.2	Second cause	301326
9.3.18.2.3	Facility	301326
9.3.18.2.4	User-user	301326
9.3.18.2.5	SS version	301326
9.3.18a	Recall \$(CCBS)\$	301326
9.3.18a.1	Recall Type.....	302327
9.3.18a.2	Facility	302327
9.3.19	Release complete.....	302327
9.3.19.1	Release complete (network to mobile station direction)	302327
9.3.19.1.1	Cause	303327
9.3.19.1.2	Facility	303327

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.3.19.1.3	User-user	303327
9.3.19.2	Release complete (mobile station to network direction)	303328
9.3.19.2.1	Cause	303328
9.3.19.2.2	Facility	303328
9.3.19.2.3	User-user	304328
9.3.19.2.4	SS version.	304328
9.3.20	Retrieve	304328
9.3.21	Retrieve Acknowledge	304329
9.3.22	Retrieve Reject	305329
9.3.23	Setup	305330
9.3.23.1	Setup (mobile terminated call establishment)	305330
9.3.23.1.1	BC repeat indicator	306331
9.3.23.1.2	Bearer capability 1 and bearer capability 2	306331
9.3.23.1.3	Facility	306331
9.3.23.1.4	Progress indicator	306331
9.3.23.1.5	Called party subaddress	306331
9.3.23.1.6	LLC repeat indicator	306331
9.3.23.1.7	Low layer compatibility I	307331
9.3.23.1.8	Low layer compatibility II	307331
9.3.23.1.9	HLC repeat indicator	307331
9.3.23.1.10	High layer compatibility i	307332
9.3.23.1.11	High layer compatibility ii	307332
9.3.23.1.12	User-user	307332
9.3.23.1.13	Priority	307332
9.3.23.1.14	Alert S(Network Indication of Alerting in the MS)S	307332
9.3.23.2	Setup (mobile originating call establishment)	307332
9.3.23.2.1	BC repeat indicator	308333
9.3.23.2.2	Facility	308333
9.3.23.2.3	LLC repeat indicator	308333
9.3.23.2.4	Low layer compatibility I	309333
9.3.23.2.5	Low layer compatibility II	309333
9.3.23.2.6	HLC repeat indicator	309333
9.3.23.2.7	High layer compatibility i	309334
9.3.23.2.8	High layer compatibility ii	309334
9.3.23.2.9	User-user	309334
9.3.23.2.10	SS version	309334
9.3.23.2.11	CLIR suppression	309334
9.3.23.2.12	CLIR invocation	309334
9.3.23.2.13	CC Capabilities	309334
9.3.23a	Start CC S(CCBS)S	310334
9.3.23a.1	CC Capabilities	310335
9.3.24	Start DTMF	310335
9.3.25	Start DTMF Acknowledge	310335
9.3.25.1	Keypad facility	311336
9.3.26	Start DTMF reject	311336
9.3.27	Status	311336
9.3.27.1	Auxiliary states	312336
9.3.28	Status enquiry	312337
9.3.29	Stop DTMF	312337
9.3.30	Stop DTMF acknowledge	313337
9.3.31	User information	313338
9.3.31.1	User-user	313338
9.3.31.2	More data	314338
9	Message functional definitions and contents	314338
9.5	GPRS Mobility Management Messages	314338
9.5.1	Attach request	314338
9.5.1.1	Old P-TMSI signature	314339
9.5.1.2	Old routing area identification	315339
9.5.1.3	Requested READY timer value	315339
9.5.1.4	Requested STANDBY timer value	315339

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.5.1.5	MS classmark	315339
9.5.2	Attach accept	315339
9.5.2.1	P-TMSI signature	315340
9.5.2.2	Negotiated READY timer	316340
9.5.2.3	Negotiated STANDBY timer	316340
9.5.2.4	Allocated P-TMSI	316340
9.5.2.5	MS identity	316340
9.5.2.6	Reject cause	316340
9.5.3	Attach complete	316340
9.5.4	Attach reject	316341
9.5.5	Detach request	317341
9.5.5.1	Reject Cause	317342
9.5.6	Detach accept	317342
9.5.7	P-TMSI reallocation command	318342
9.5.8	P-TMSI reallocation complete	318343
9.5.9	Authentication and ciphering request	319343
9.5.9.1	Authentication Parameter RAND	319344
9.5.10	Authentication and ciphering response	319344
9.5.10.1	Authentication Parameter SRES	320344
9.5.10.2	IMEISV	320345
9.5.11	Authentication and ciphering reject	320345
9.5.12	Identity request	320345
9.5.13	Identity response	321345
9.5.14	Routing area update request	321346
9.5.14.1	Old P-TMSI signature	322346
9.5.14.2	Requested READY timer value	322346
9.5.14.3	Requested STANDBY timer value	322347
9.5.14.4	MS classmark	322347
9.5.15	Routing area update accept	322347
9.5.15.1	P-TMSI signature	323347
9.5.15.2	P-TMSI	323347
9.5.15.3	TMSI	323347
9.5.15.4	Routing area identification	323348
9.5.15.5	List of LLC V(R)s	323348
9.5.15.6	Negotiated READY timer value	323348
9.5.15.7	Negotiated STANDBY timer value	323348
9.5.15.8	Reject cause	324348
9.5.16	Routing area update complete	324348
9.5.16.1	List of LLC V(R)s	324348
9.5.17	Routing area update reject	324349
9.5.18	GMM Status	325349
9.5.19	GMM Information	325349
9.5.19.1	Full name for network	326350
9.5.19.2	Short name for network	326350
9.5.19.3	Network time zone	326350
9.5.19.4	Network time zone and time	326350
9.6	GPRS Session Management Messages	326350
9.6.1	Activate PDP context request	326350
9.6.1.1	Access point name	326351
9.6.1.2	Requested protocol configuration options format	327351
9.6.2	Activate PDP context accept	327351
9.6.2.1	PDP address	327352
9.6.2.2	Protocol configuration options	327352
9.6.3	Activate PDP context reject	327352
9.6.4	Request PDP context activation	328352
9.6.5	Request PDP context activation reject	328353
9.6.6	Modify PDP context request	329353
9.6.7	Modify PDP context accept	329354
9.6.8	Deactivate PDP context request	329354
9.6.9	Deactivate PDP context accept	330355

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

9.6.10	Activate AA PDP context request	330355
9.6.10.1	Requested AA-READY timer value	331255
9.6.11	Activate AA PDP context accept	331356
9.6.11.1	Packet data protocol address	331356
9.6.11.2	Protocol configuration options	332356
9.6.11.1	Negotiated AA-Ready timer value	332356
9.6.12	Activate AA PDP context reject	332356
9.6.13	Deactivate AA PDP context request	332357
9.6.14	Deactivate AA PDP context accept	332357
10	General message format and information elements coding	333358
10.1	Overview	333358
10.2	Protocol Discriminator	334358
10.3	Skip indicator and transaction identifier	334359
10.3.1	Skip indicator	334359
10.3.2	Transaction identifier	334359
10.4	Message Type	334359
10.5	Other information elements	338363
10.5.1	Common information elements	340365
10.5.1.1	Cell identity	340365
10.5.1.2	Ciphering Key Sequence Number	340366
10.5.1.3	Location Area Identification	341366
10.5.1.4	Mobile Identity	342368
10.5.1.5	Mobile Station Classmark 1	344370
10.5.1.6	Mobile Station Classmark 2	345371
10.5.1.7	Mobile Station Classmark 3	348374
10.5.1.8	Spare Half Octet	351377
10.5.1.9	Descriptive group or broadcast call reference	351377
10.5.1.10	Group Cipher Key Number	353379
10.5.1.10a	PD and SAPI \$(CCBS)\$	354380
10.5.1.11	Priority Level	355380
10.5.2	Radio Resource management information elements	355381
10.5.2.1a	BA Range	355381
10.5.2.1b	Cell Channel Description	357383
10.5.2.1b.1	General description	358384
10.5.2.1b.2	Bit map 0 format	359385
10.5.2.1b.3	Range 1024 format	360386
10.5.2.1b.4	Range 512 format	361387
10.5.2.1b.5	Range 256 format	363388
10.5.2.1b.6	Range 128 format	365389
10.5.2.1b.7	Variable bit map format	366390
10.5.2.2	Cell Description	367390
10.5.2.3	Cell Options (BCCH)	368391
10.5.2.3a	Cell Options (SACCH)	368391
10.5.2.4	Cell Selection Parameters	370393
10.5.2.4a	MAC Mode and Channel Coding Requested	372394
10.5.2.5	Channel Description	373395
10.5.2.5a	Channel Description 2	375397
10.5.2.6	Channel Mode	377399
10.5.2.7	Channel Mode 2	378400
10.5.2.8	Channel Needed	379401
10.5.2.8a	Channel Request Description	379401
10.5.2.9	Cipher Mode Setting	381403
10.5.2.10	Cipher Response	381403
10.5.2.11	Control Channel Description	382404
10.5.2.12	Frequency Channel Sequence	384406
10.5.2.13	Frequency List	385407
10.5.2.13.1	General description	386408
10.5.2.13.2	Bit map 0 format	386408
10.5.2.13.3	Range 1024 format	387409
10.5.2.13.4	Range 512 format	389411

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

10.5.2.13.5	Range 256 format.....	392414
10.5.2.13.6	Range 128 format.....	395417
10.5.2.13.7	Variable bit map format	398420
10.5.2.14	Frequency Short List.....	399421
10.5.2.14a	Frequency Short List 2.....	399421
10.5.2.14b	Group Channel Description	400422
10.5.2.15	Handover Reference	402424
10.5.2.16	IA Rest Octets.....	402424
10.5.2.17	IAR Rest Octets	405427
10.5.2.18	IAX Rest Octets.....	405427
10.5.2.19	L2 Pseudo Length.....	406428
10.5.2.20	Measurement Results	406428
10.5.2.21	Mobile Allocation.....	410432
10.5.2.21a	Mobile Time Difference	411433
10.5.2.21b	Multislot Allocation.....	412434
10.5.2.21c	NC mode.....	413435
10.5.2.22	Neighbour Cells Description	414436
10.5.2.22a	Neighbour Cells Description 2	415437
10.5.2.22c	NT/N Rest Octets	416438
10.5.2.23	P1 Rest Octets.....	416438
10.5.2.24	P2 Rest Octets.....	417439
10.5.2.25	P3 Rest Octets.....	418440
10.5.2.25a	Packet Channel Description and Packet Response or	419441
10.5.2.25b	Packet Response Type and Dedicated mode or TBF.....	420442
10.5.2.25c	RR Packet Uplink Assignment	421443
10.5.2.25c.1	Allocation Bitmap.....	422444
10.5.2.25d	RR Packet Downlink Assignment	423445
10.5.2.26	Page Mode.....	425447
10.5.2.26a	[Spare]	425447
10.5.2.26b	[Spare]	425447
10.5.2.26c	[Spare]	425447
10.5.2.26d	[Spare]	426447
10.5.2.27	NCC Permitted	426447
10.5.2.28	Power Command	426448
10.5.2.28a	Power Command and access type.....	427448
10.5.2.29	RACH Control Parameters	427449
10.5.2.30	Request Reference	429450
10.5.2.31	RR Cause	430451
10.5.2.32	SI 1 Rest Octets	431452
10.5.2.33	SI 2bis Rest Octets.....	432453
10.5.2.33a	SI 2ter Rest Octets	433454
10.5.2.34	SI 3 Rest Octets	433454
10.5.2.35	SI 4 Rest Octets	434455
10.5.2.35a	SI 6 Rest Octets	437457
10.5.2.36	SI 7 Rest Octets	437458
10.5.2.37	SI 8 Rest Octets	437458
10.5.2.37a	SI 9 Rest Octets	438459
10.5.2.37b	SI 13 Rest Octets	439460
10.5.2.37c	SI 14 Rest Octets	442463
10.5.2.37d	SI 15 Rest Octets	443464
10.5.2.38	Starting Time	444465
10.5.2.39	Synchronization Indication	445466
10.5.2.40	Timing Advance	446467
10.5.2.41	Time Difference.....	446467
10.5.2.41a	TLLI	447468
10.5.2.42	TMSI	447469
10.5.2.42c	VGCS target mode Indication.....	448469
10.5.2.43	Wait Indication	449470
10.5.2.44	SI10 rest octets \$(ASCII)\$.....	449471
10.5.2.45	EXTENDED MEASUREMENT RESULTS \$(MAFA)\$	452473

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

10.5.3	Mobility management information elements	454475
10.5.3.1	Authentication parameter RAND	454475
10.5.3.2	Authentication parameter SRES	455476
10.5.3.3	CM service type	455476
10.5.3.4	Identity type	456477
10.5.3.5	Location updating type	456477
10.5.3.5a	Network Name	457478
10.5.3.6	Reject cause	458479
10.5.3.7	Follow-on Proceed	459480
10.5.3.8	Time Zone	459480
10.5.3.9	Time Zone and Time	460481
10.5.4	Call control information elements	461482
10.5.4.1	Extensions of codesets	461482
10.5.4.2	Locking shift procedure	462483
10.5.4.3	Non-locking shift procedure	462483
10.5.4.4	Auxiliary states	463484
10.5.4.5	Bearer capability	464485
10.5.4.5.1	Static conditions for the bearer capability IE contents	475496
10.5.4.5a	Call Control Capabilities	476497
10.5.4.6	Call state	477498
10.5.4.7	Called party BCD number	478499
10.5.4.8	Called party subaddress	480501
10.5.4.9	Calling party BCD number	481502
10.5.4.10	Calling party subaddress	482503
10.5.4.11	Cause	483504
10.5.4.11a	CLIR suppression	488509
10.5.4.11b	CLIR invocation	488509
10.5.4.12	Congestion level	489510
10.5.4.13	Connected number	489510
10.5.4.14	Connected subaddress	490511
10.5.4.15	Facility	490511
10.5.4.16	High layer compatibility	490511
10.5.4.16.1	Static conditions for the high layer compatibility IE contents	491512
10.5.4.17	Keypad facility	491512
10.5.4.18	Low layer compatibility	492513
10.5.4.19	More data	492513
10.5.4.20	Notification indicator	493514
10.5.4.21	Progress indicator	493514
10.5.4.21a	Recall type \$(CCBS)\$	494515
10.5.4.22	Repeat indicator	495516
10.5.4.22a	Reverse call setup direction	495516
10.5.4.22b	SETUP Container \$(CCBS)\$	496517
10.5.4.23	Signal	496517
10.5.4.24	SS Version Indicator	496517
10.5.4.25	User-user	497518
10.5.4.26	Alerting Pattern \$(NIA)\$	498519
10.5.4.27	Allowed actions \$(CCBS)\$	499520
10.5.5	GPRS mobility management information elements	500521
10.5.5.1	Attach result	500521
10.5.5.2	Attach type	500521
10.5.5.3	Ciphering algorithm	501522
10.5.5.4	Ciphering indicator	501522
10.5.5.5	Detach type	502523
10.5.5.6	DRX parameter	503524
10.5.5.7	Force to standby	505525
10.5.5.8	P-TMSI signature	505526
10.5.5.9	Identity type 2	505526
10.5.5.10	IMEISV request	506527
10.5.5.11	LLC V(R) list	506527
10.5.5.12	MS classmark 4	507528

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

10.5.5.13	Mobile station identity	509530
10.5.5.14	Reject cause for GMM procedures	509530
10.5.5.15	Routing area identification	510531
10.5.5.16	Timer value	511532
10.5.5.17	Update result	512533
10.5.5.18	Update type	512533
10.5.6	Session management information elements	513534
10.5.6.1	Access Point Name	513534
10.5.6.2	Network service access point identifier	514534
10.5.6.3	Protocol configuration options	514535
10.5.6.3a	Protocol configuration options format	515536
10.5.6.4	Packet data protocol address	515536
10.5.6.5	Quality of service	517538
10.5.6.6	Reject cause for SM procedures	520541
10.5.6.7	SM procedure initiator indicator	520541
10.5.6.8	AA deactivation cause	521542
11	List of system parameters	521542
11.1	Timers and counters for radio resource management	522543
11.1.1	Timers on the mobile station side	522543
11.1.2	Timers on the network side	523544
11.1.3	Other parameters	525546
11.2	Timers of mobility management	526547
11.2.1	Timer T3240	527548
11.2.2	Timers of GPRS mobility management	528549
11.2.3	Timers of session management	530551
11.3	Timers of circuit-switched call control	531552
Annex A (informative):	Example of subaddress information element coding	533554
Annex B (normative):	Compatibility checking	534555
B.1	Introduction	534555
B.2	Calling side compatibility checking	534555
B.2.1	Compatibility checking of the CM SERVICE REQUEST message	534555
B.2.2	Compatibility/Subscription checking of the SETUP message	534555
B.3	Called side compatibility checking	534555
B.3.1	Compatibility checking with addressing information	535556
B.3.2	Network-to-MS compatibility checking	535556
B.3.3	User-to-User compatibility checking	535556
B.4	High layer compatibility checking	535556
Annex C (normative):	Low layer information coding principles	536557
C.1	Purpose	536557
C.2	Principles	536557
C.2.1	Definition of types of information	536557
C.2.2	Examination by network	536557
C.2.3	Location of type I information	537558
C.2.4	Location of types II and III information	537558
C.2.5	Relationship between bearer capability and low layer compatibility information elements	537558
Annex D (informative):	Examples of bearer capability information element coding	538559
D.1	Coding for speech for a full rate support only mobile station	539560
D.1.1	Mobile station to network direction	539560
D.1.2	Network to mobile station direction	539560
D.2	An example of a coding for modem access with V22-bis, 2.4 kbit/s, 8 bit no parity	539560
D.2.1	Mobile station to network direction, data compression allowed	539560

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

D.2.2	Network to mobile station direction, data compression possible	540561
D.3	An example of a coding for group 3 facsimile (9.6 kbit/s, transparent)	540561
D.3.1	Mobile station to network direction	540561
D.3.2	Network to mobile station direction	541562

Annex E (informative):	Comparison between call control procedures specified in GSM 04.08 and CCITT Recommendation Q.931	542563
-------------------------------	---	---------------

Annex F (informative):	GSM specific cause values for radio resource management	546567
-------------------------------	--	---------------

Annex G (informative):	GSM specific cause values for mobility management	548569
-------------------------------	--	---------------

G.1	Causes related to MS identification	548569
G.2	Cause related to subscription options	548569
G.3	Causes related to PLMN specific network failures and congestion	549570
G.4	Causes related to nature of request	549570
G.5	Causes related to invalid messages	549570
G6	Additional cause codes for GMM	550571

Annex H (informative):	GSM specific cause values for call control	551572
-------------------------------	---	---------------

H.1	Normal class	551572
H.1.1	Cause No. 1 "unassigned (unallocated) number"	551572
H.1.2	Cause No. 3 "no route to destination"	551572
H.1.3	Cause No. 6 "channel unacceptable"	551572
H.1.4	Cause No. 8 "operator determined barring"	551572
H.1.5	Cause No.16 "normal call clearing"	551572
H.1.6	Cause No.17 "user busy"	551572
H.1.7	Cause No. 18 "no user responding"	551572
H.1.8	Cause No. 19 "user alerting, no answer"	551572
H.1.9	Cause No. 21 "call rejected"	552573
H.1.10	Cause No. 22 "number changed"	552573
H.1.11	Cause No. 26 "non-selected user clearing"	552573
H.1.12	Cause No. 27 "destination out of order"	552573
H.1.13	Cause No. 28 "invalid number format (incomplete number)"	552573
H.1.14	Cause No. 29 "facility rejected"	552573
H.1.15	Cause No. 30 "response to STATUS ENQUIRY"	552573
H.1.16	Cause No. 31 "normal, unspecified"	552573
H.2	Resource unavailable class	552573
H.2.1	Cause No. 34 "no circuit/channel available"	552573
H.2.2	Cause No. 38 "network out of order"	552573
H.2.3	Cause No. 41 "temporary failure"	553574
H.2.4	Cause No. 42 "switching equipment congestion"	553574
H.2.5	Cause No. 43 "access information discarded"	553574
H.2.6	Cause No. 44 "requested circuit/channel not available"	553574
H.2.7	Cause No. 47 "resource unavailable, unspecified"	553574
H.3	Service or option not available class	553574
H.3.1	Cause No. 49 "quality of service unavailable"	553574
H.3.2	Cause No. 50 "Requested facility not subscribed"	553574
H.3.3	Cause No. 55 "Incoming calls barred within the CUG"	553574
H.3.4	Cause No. 57 "bearer capability not authorized"	553574
H.3.5	Cause No. 58 "bearer capability not presently available"	554575
H.3.6	Cause No. 63 "service or option not available, unspecified"	554575
H.3.7	Cause No. 68 "ACM equal to or greater than ACMmax"	554575

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

H.4	Service or option not implemented class	<u>554</u> 575
H.5	Invalid message (e.g., parameter out of range) class	<u>554</u> 575
H.6	Protocol error (e.g., unknown message) class	<u>555</u> 576
H.7	Interworking class	<u>555</u> 576
Annex I (informative):	GSM specific cause values for session management	<u>555</u>576
I.1	Causes related to nature of request	<u>556</u> 577
I.2	Causes related to invalid messages	<u>556</u> 577
Annex J (informative):	Algorithm to encode frequency list information elements	<u>557</u>578
J.1	Introduction	<u>557</u> 578
J.2	General principle	<u>557</u> 578
J.3	Performances	<u>559</u> 580
J.4	Encoding algorithm	<u>560</u> 581
J.5	Decoding	<u>562</u> 583
J.6	A detailed example	<u>564</u> 585
Annex K (informative):	Default Codings of Information Elements	<u>565</u>586
K.1	Common information elements	<u>565</u> 586
K.2	Radio Resource management information elements	<u>565</u> 586
K.3	Mobility management information elements	<u>567</u> 588
K.4	Call control information elements	<u>567</u> 588
K.5	GPRS mobility management information elements	<u>568</u> 589
K.6	Session management information elements	<u>569</u> 590
Annex L (informative):	Change Record	<u>570</u>591
History		<u>574</u> 595

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

4.7.11.1 MS side

The AA-READY timer value shall either be the default value or a value set by the network and sent to the MS by means of an SM message. The READY timer shall be reset and restarted by the MS when user data is sent. When the AA-READY timer expires or a routing area border is crossed, the MS shall deactivate the anonymous access locally, i.e. no signalling messages are exchanged between the MS and the network.

While the AA-READY timer is running, the MS shall perform cell updates when a new cell is selected within the same RA.

4.7.11.2 Network side

The AA-READY timer value shall either be the default value or a value received from the MS and possibly modified by the network and sent to the MS by means of an SM message. The AA-READY timer shall be reset and restarted by the network when valid user data is received. When the AA-READY timer expires, the network shall deactivate the anonymous access locally, i.e. no signalling messages are exchanged between the network and the MS.

4.7.12 GMM Information procedure

The GMM information message support is optional in the network. The MM information procedure may be invoked by the network at any time during an established GMM context.

4.7.12.1 GMM information procedure initiation by the network

The GMM information procedure consists only of the GMM INFORMATION message sent from the network to the mobile station. During an established GMM context, the network may send none, one, or more GMM INFORMATION messages to the mobile station. If more than one GMM INFORMATION message is sent, the messages need not have the same content.

4.7.12.2 GMM information procedure in the mobile station

When the mobile station (supporting the GMM information message) receives an GMM INFORMATION message, it shall accept the message and optionally use the contents to update appropriate information stored within the mobile station.

If the mobile station does not support the GMM information message the mobile station shall ignore the contents of the message and return an GMM STATUS message with cause #97.

5 Elementary procedures for circuit-switched Call Control

5.1 Overview

5.1.1 General

This section describes the call control (CC) protocol, which is one of the protocols of the Connection Management (CM) sublayer (see GSM 04.07).

Every mobile station must support the call control protocol. If a mobile station does not support any bearer capability at all then it shall respond to a SETUP message with a RELEASE COMPLETE message as specified in section 5.2.2.2.

In the call control protocol, more than one CC entity are defined. Each CC entity is independent from each other and shall communicate with the correspondent peer entity using its own MM connection. Different CC entities use different transaction identifiers.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

With a few exceptions this Technical Specification describes the call control protocol only with regard to two peer entities. The call control entities are described as communicating finite state machines which exchange messages across the radio interface and communicate internally with other protocol (sub)layers. This description is only normative as far as the consequential externally observable behaviour is concerned.

Certain sequences of actions of the two peer entities compose "elementary procedures" which are used as a basis for the description in this section. These elementary procedures may be grouped into the following classes:

- call establishment procedures;
- call clearing procedures;
- call information phase procedures;
- miscellaneous procedures.

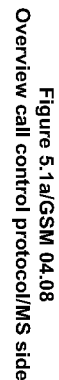
The terms "mobile originating" or "mobile originated" (MO) are used to describe a call initiated by the mobile station. The terms "mobile terminating" or "mobile terminated" (MT) are used to describe a call initiated by the network.

Figure 5.1a/GSM 04.08 gives an overview of the main states and transitions on the mobile station side.

The MS side extension figure 5.1a.1/GSM 04.08 shows how for the Network Initiated MO call the MS reaches state U1.0 from state U0 \$(CCBS)\$.

Figure 5.1b/GSM 04.08 gives an overview of the main states and transitions on the network side.

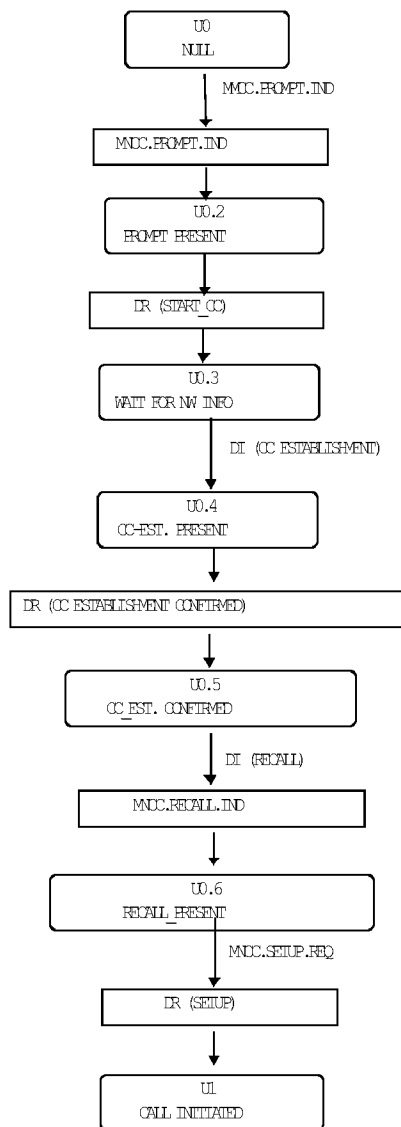
The Network side extension figure 5.1b.1/GSM 04.08 shows for Network Initiated MO Calls the Network reaches state N1.0 from state N0 \$(CCBS)\$.



Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

FIGURE 5.1a.1/GSM 04.08
Overview call control protocol/MS side, extension:



Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

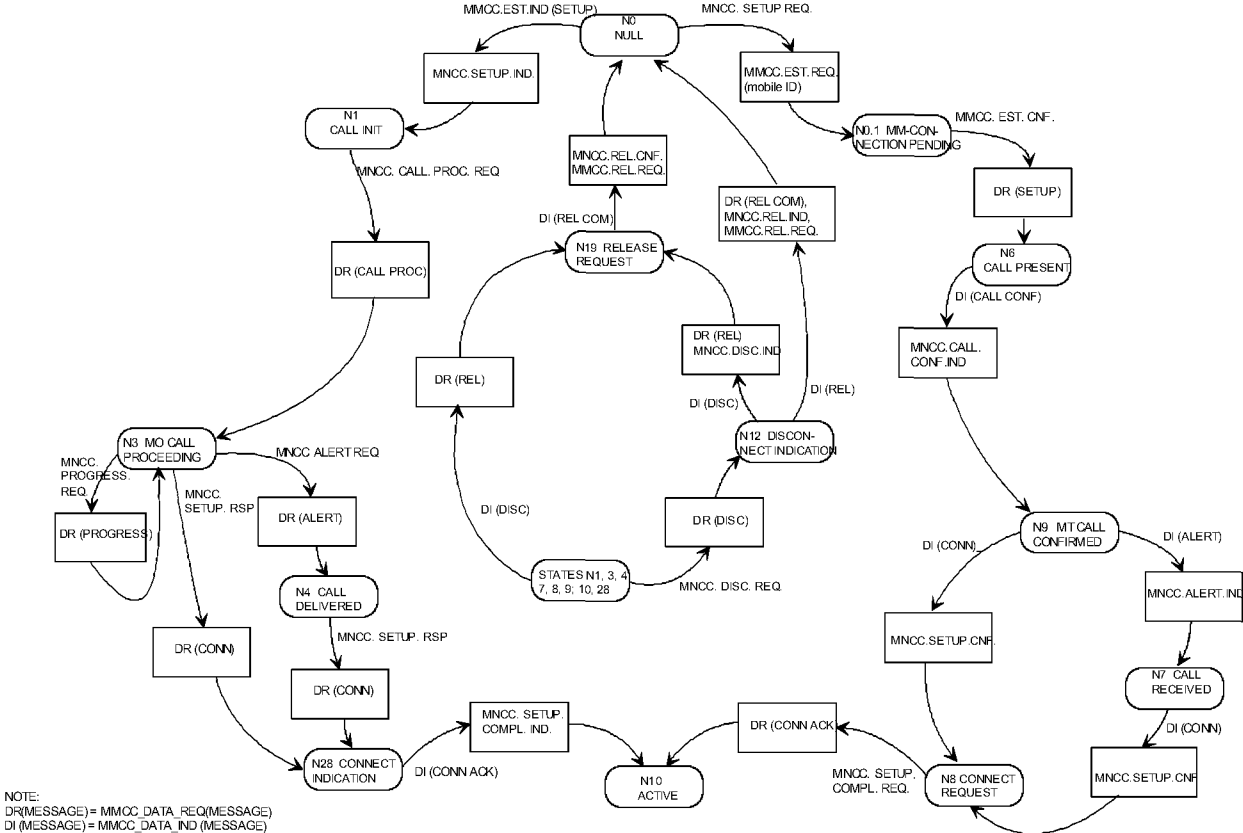
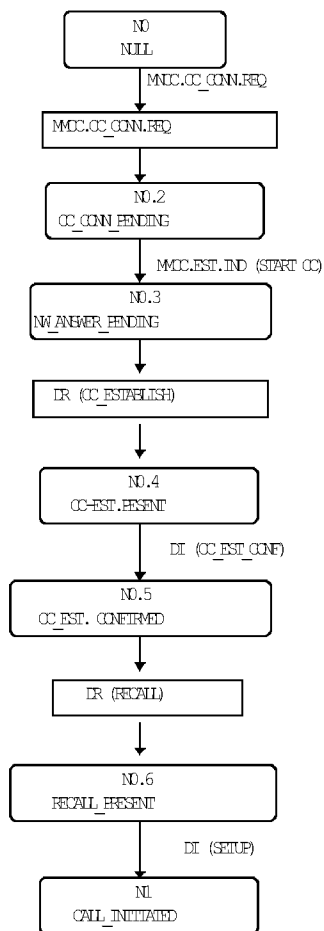


Figure 5.1b/GSM 04.08
Overview call control protocol/Network side

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

FIGURE 5.1b.1/GSM 04.08
Overview call control protocol/Network side, extension:



5.1.2 Call Control States

5.1.2.1 Call states at the mobile station side of the interface

The states which may exist on the mobile station side of the radio interface are defined in this section.

NOTE: States U0.1, U0.2, U0.3, U0.4, U0.5, U0.6, U26, and U27 are GSM specific. All other states are ITU-T defined.

5.1.2.1.1 Null (State U0)

No call exists.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.1.2.1.2 MM Connection pending (U0.1)

This state exists for a mobile originating call, when the mobile station requests the establishment of a MM connection.

5.1.2.1.2a CC prompt present (U0.2) \$(CCBS)\$

This state exists for a mobile originating call when the network has prompted the mobile station to establish a CC connection but the mobile station has not yet responded.

Note: This state is transient.

5.1.2.1.2b Wait for network information (U0.3) \$(CCBS)\$

This state exists for a mobile originating call when the mobile station has responded to the prompt from the network to establish a CC connection and the mobile station is waiting for further information from the network.

5.1.2.1.2c CC-Establishmentpresent (U0.4) \$(CCBS)\$

This state exists for a mobile originating call when the mobile station has received a CC-establishment request but has not yet responded.

Note: This state is transient.

5.1.2.1.2d CC-Establishment confirmed (U0.5) \$(CCBS)\$

This state exists for a mobile originating call when the mobile station has sent the acknowledgement that the mobile station has received all the CC information that is needed.

5.1.2.1.2e Recall present (U0.6) \$(CCBS)\$

This state exists for a mobile originating call when the mobile station has received a recall request but has not yet responded.

Note: This state is transient.

5.1.2.1.3 Call initiated (U1)

This state exists for a mobile originating call, when the MS requests call establishment from the network.

5.1.2.1.4 Mobile originating call proceeding (U3)

This state exists for a mobile originating call when the mobile station has received acknowledgement that the network has received all call information necessary to effect call establishment.

5.1.2.1.5 Call delivered (U4)

This state exists for a mobile originating call, when the calling mobile station has received an indication that remote user alerting has been initiated.

5.1.2.1.6 Call present (U6)

This state exists for a mobile terminating call when the mobile station has received a call establishment request but has not yet responded.

5.1.2.1.7 Call received (U7)

This state exists for a mobile terminating call when the mobile station has indicated alerting but has not yet answered.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.1.2.1.8 Connect Request (U8)

This state exists for a mobile terminating call, when the mobile station has answered the call and is waiting to be awarded the call.

5.1.2.1.9 Mobile terminating call confirmed (U9)

This state exists for a mobile terminating call when the mobile station has sent acknowledgement that the mobile station has received all call information necessary to effect call establishment.

5.1.2.1.10 Active (U10)

This state exists for a mobile terminating call when the MS has answered the call. This state exists for a mobile originating call when the MS has received an indication that the remote user has answered the call.

5.1.2.1.11 Disconnect request (U11)

This state exists when the mobile station has requested the network to clear the end-to-end connection (if any) and is waiting for a response.

5.1.2.1.12 Disconnect indication (U12)

This state exists when the mobile station has received an invitation to disconnect because the network has disconnected the end-to-end connection (if any).

5.1.2.1.13 Release request (U19)

This state exists when the MS has requested the network to release and is waiting for a response.

5.1.2.1.14 Mobile originating modify (U26)

This state exists when the mobile station has sent a request to the network for a new mode but has not yet received an answer.

5.1.2.1.15 Mobile terminating modify (U27)

This state exists when the mobile station has received a request from the network for a new mode and has not yet sent a response to this request.

5.1.2.2 Network call states

NOTE: States N0.1, N0.2, N0.3, N0.4, N0.5, N0.6, N26, N27, N28, N3a, N4,a, N7a, and N9a are GSM specific. All other states are CCITT defined.

The call states that may exist on the network side of the radio interface are defined in this section.

5.1.2.2.1 Null (State N0)

No call exists.

5.1.2.2.2 MM connection pending (N0.1)

This state exists for a mobile terminating call, when the network requests the establishment of a MM connection.

5.1.2.2.2a CC connection pending (N0.2) \$(CCBS)\$

This state exists for a mobile originating call when the network has requested the mobile station to establish a CC connection.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.1.2.2.2b Network answer pending (N0.3) \$(CCBS)\$

This state exists for a mobile originating call when the mobile station has established a CC connection upon the request of the network, but the network has not yet informed the mobile station of the reason for the network's action.

5.1.2.2.2c CC-Establishment present (N0.4) \$(CCBS)\$

This state exists for a mobile originating call when the network has sent a CC establishment request but has not yet received a satisfactory response.

5.1.2.2.2d CC-Establishment confirmed (N0.5) \$(CCBS)\$

This state exists for a mobile originating call when the network has received acknowledgement that the mobile station has received all call information necessary to effect call establishment.

5.1.2.2.2e Recall present (N0.6) \$(CCBS)\$
This state exists for a mobile originating call when the network has sent a recall request but has not yet received a satisfactory response.

5.1.2.2.3 Call initiated (N1)

This state exists for a mobile originating call when the network has received a call establishment request but has not yet responded.

5.1.2.2.4 Mobile originating call proceeding (N3)

This state exists for a mobile originating call when the network has sent acknowledgement that the network has received all call information necessary to effect call establishment.

5.1.2.2.5 Call delivered (N4)

This state exists for a mobile originating call when the network has indicated that remote user alerting has been initiated.

5.1.2.2.6 Call present (N6)

This state exists for a mobile terminating call when the network has sent a call establishment request but has not yet received a satisfactory response.

5.1.2.2.7 Call received (N7)

This state exists for a mobile terminating call when the network has received an indication that the mobile station is alerting but has not yet received an answer.

5.1.2.2.8 Connect request (N8)

This state exists for a mobile terminating call when the network has received an answer but the network has not yet awarded the call.

5.1.2.2.9 Mobile terminating call confirmed (N9)

This state exists for a mobile terminating call when the network has received acknowledgement that the mobile station has received all call information necessary to effect call establishment.

5.1.2.2.10 Active (N10)

This state exists for a mobile terminating call when the network has awarded the call to the called mobile station. This state exists for a mobile originating call when the network has indicated that the remote user has answered the call.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.1.2.2.11 {Not used}

5.1.2.2.12 Disconnect indication (N12)

This state exists when the network has disconnected the end- to-end connection (if any) and has sent an invitation to disconnect the mobile station to network connection.

5.1.2.2.13 Release request (N19)

This state exists when the network has requested the MS to release and is waiting for a response.

5.1.2.2.14 Mobile originating modify (N26)

This state exists when the network has received a request from the mobile station for a new mode but has not yet sent a response.

5.1.2.2.15 Mobile terminating modify (N27)

This state exists when the network has sent a request to the mobile station for a new mode but has not yet received an answer.

5.1.2.2.16 Connect Indication (N28)

This state exists for a mobile originating call when the network has indicated that the remote user has answered the call and the network is waiting for acknowledgement by the mobile station.

5.2 Call establishment procedures

Establishment of a call is initiated by request of upper layer in either the mobile station or the network; it consists of:

- the establishment of a CC connection between the mobile station and the network;
- the activation of the codec or interworking function.

Whenever it is specified in GSM 04.08, section 5 that the mobile station shall attach the user connection, this means that the mobile station shall activate the codec or interworking function as soon as an appropriate channel is available. The mobile station shall de-activate the codec or interworking function whenever an appropriate channel is no longer available. As soon as an appropriate channel is (again) available, the codec or interworking function shall be re-activated. If a new order to attach the user connection is received, the new order shall supersede the previous one.

A channel shall be considered as appropriate if it is consistent with the possibly negotiated bearer capability applicable for the actual phase of the call. The mobile station shall not consider a channel as not appropriate because the type of the channel (full rate/half rate) is not the preferred one. If:

- the user connection has to be attached but no appropriate channel is available for a contiguous time of 30 seconds; or if
- the codec or interworking function is de-activated for a contiguous time of 30 seconds;

then the mobile station may initiate call clearing.

Upon request of upper layers to establish a call, restricting conditions for the establishment of the call are examined. These restricting conditions concern the states of parallel CC entities and are defined elsewhere. If these restricting conditions are fulfilled, the call establishment is rejected. Otherwise a CC entity in state U0, "null", is selected to establish the call. It initiates the establishment by requesting the MM sublayer to establish an MM connection.

5.2.1 Mobile originating call establishment

The call control entity of the mobile station initiates establishment of a CC connection by requesting the MM sublayer to establish a mobile originating MM connection and entering the "MM connection pending" state. There are two kinds of

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

a mobile originating call: basic call and emergency call. The request to establish an MM connection shall contain a parameter to specify whether the call is a basic or an emergency call. This information may lead to specific qualities of services to be provided by the MM sublayers. Timer T303 is started when the CM SERVICE REQUEST message is sent.

For mobile stations supporting eMLPP basic calls may optionally have an associated priority level as defined in GSM 03.67. This information may also lead to specified qualities of service to be provided by the MM sublayers.

While being in the "MM connection pending" state, the call entity of the mobile station may cancel the call prior to sending the first call control message according to the rules given in section 4.5.1.7.

Having entered the "MM connection pending" state, upon MM connection establishment, the call control entity of the mobile station sends a setup message to its peer entity. This setup message is

- a SETUP message, if the call to be established is a basic call, and
- an EMERGENCY SETUP message, if the call to be established is an emergency call.

It then enters the "call initiated" state. Timer T303 is not stopped.

The setup message shall contain all the information required by the network to process the call. In particular, the SETUP message shall contain the called party address information.

If timer T303 elapses in the "MM connection pending" state, the MM connection in progress shall be aborted and the user shall be informed about the rejection of the call.

5.2.1.1 Call initiation

The "call initiated" state is supervised by timer T303. For normal MO calls, this timer will have already been started after entering the "MM connection pending" state. For network-initiated MO calls this timer will be started in the recall present state as defined in section 5.2.3.4

When the call control entity of the mobile station is in the "call initiated" state and if it receives:

- i) a CALL PROCEEDING message, it shall proceed as described in section 5.2.1.3;
- ii) an ALERTING message, it shall proceed as described in section 5.2.1.5;
- iii) a CONNECT message, it shall proceed as described in section 5.2.1.6;
- iv) a RELEASE COMPLETE message it shall proceed as described in section 5.2.1.2.

Abnormal case:

- If timer T303 elapses in the "call initiated" state before any of the CALL PROCEEDING, ALERTING, CONNECT or RELEASE COMPLETE messages has been received, the clearing procedure described in section 5.4 is performed.

5.2.1.2 Receipt of a setup message

In the "null" or "recall present" states, upon receipt of a setup message (a SETUP message or an EMERGENCY SETUP message, see section 5.2.1.1), the call control entity of the network enters the "call initiated" state. It shall then analyse the call information contained in the setup message.

- i) If, following the receipt of the setup message, the call control entity of the network determines that the call information received from the mobile station is invalid (e.g. invalid number), then the network shall initiate call clearing as defined in section 5.4 with one of the following cause values:

1 "unassigned (unallocated) number"

3 "no route to destination"

22 "number changed"

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

28 "invalid number format (incomplete number)"

- ii) If, following the receipt of the setup message, the call control entity of the network determines that a requested service is not authorized or is not available, it shall initiate call clearing in accordance with section 5.4.2 with one of the following cause values:

8 "operator determined barring",

57 "bearer capability not authorized",

58 "bearer capability not presently available",

63 "service or option not available, unspecified", or

65 "bearer service not implemented".

- iii) Otherwise, the call control entity of the network shall either:

- send a CALL PROCEEDING message to its peer entity to indicate that the call is being processed; and enter the "mobile originating call proceeding" state.
- or: send an ALERTING message to its peer entity to indicate that alerting has been started at the called user side; and enter the "call received" state.
- or: send a CONNECT message to its peer entity to indicate that the call has been accepted at the called user side; and enter the "connect request" state.

The call control entity of the network may insert bearer capability information element(s) in the CALL PROCEEDING message to select options presented by the mobile station in the Bearer Capability information element(s) of the SETUP message. The bearer capability information element(s) shall contain the same parameters as received in the SETUP except those presenting a choice. Where choices were offered, appropriate parameters indicating the results of those choices shall be included.

The CALL PROCEEDING message may also contain the priority of the call in the case where eMLPP is applied and where the network has assigned a different priority to the call than that requested by the user, or where the user has not requested a priority and the network has assigned a default priority. Mobile stations supporting eMLPP shall indicate this priority level to higher sublayers and store this information for the duration of the call for further action. Mobile stations not supporting eMLPP shall ignore this information element if provided in a CALL PROCEEDING message.

The call control entity of the network having entered the "mobile originating call proceeding" state, the network may initiate the assignment of a traffic channel according to section 5.2.1.9 (early assignment).

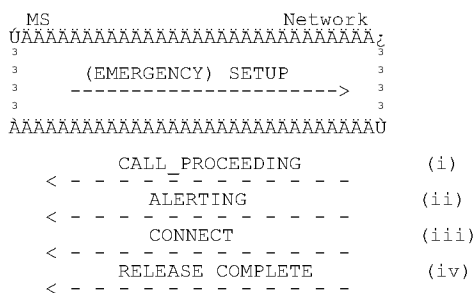


Figure 5.2/GSM 04.08
Mobile originated call initiation and possible subsequent responses.

5.2.1.3 Receipt of a CALL PROCEEDING message

Having entered the "call initiated" state, when the call control entity of the mobile station receives a CALL PROCEEDING message, it shall stop timer T303; start timer T310 unless

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

- the CALL PROCEEDING message contains a *progress indicator* IE specifying progress description #1, #2, or #64; or
- it has received a PROGRESS message containing a *progress indicator* IE specifying progress description #1, #2, or #64 prior to the CALL PROCEEDING message

and enter the "mobile originating call proceeding" state.

Abnormal case:

If timer T310 elapses before any of the ALERTING, CONNECT or DISCONNECT messages has been received, the mobile station shall perform the clearing procedure described in section 5.4.

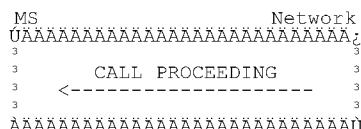


Figure 5.3/GSM 04.08
Call proceeding sequence at mobile originating
call establishment

5.2.1.4 Notification of progressing mobile originated call

In this section, the term "interworking" is used only in the meaning of interworking with a network other than PLMN or ISDN, not as interworking between PLMN and ISDN since this is the normal case. In this sense, PLMN and ISDN are seen within the same environment, called the PLMN/ISDN environment.

5.2.1.4.1 Notification of interworking in connection with mobile originated call establishment

During call establishment, the call may leave a PLMN/ISDN environment; e.g., because of interworking with another network, with a non-PLMN/ISDN user, or with non-PLMN/ISDN equipment within the called user's premises; the call may also return to a PLMN/ISDN environment. When such situations occur, the network may send a *progress indicator* information element to the calling mobile station either:

- a) in an appropriate call control message, if a state change is required (e.g. ALERTING or CONNECT); or,
- b) in the PROGRESS message, if no state change is appropriate.

This *progress indicator* information element shall contain one of the following progress description values:

- a) #1 "call is not end-to-end PLMN/ISDN; further call progress information may be available in-band".
- b) #2 "destination address is non-PLMN/ISDN".
- c) #4 "call has returned to PLMN/ISDN".

See also sections 5.5.1 and 5.5.6 for further reactions of the mobile station.

5.2.1.4.2 Call progress in the PLMN/ISDN environment

In order to inform the mobile station that the call is progressing in the PLMN/ISDN environment the network may send a *progress indicator* information element to the calling mobile station either:

- a) in an appropriate call control message, if a state change is required (e.g., ALERTING or CONNECT); or
- b) in the PROGRESS message, if no state change is appropriate.

This *progress indicator* information element shall contain progress description value #32 "Call is end-to-end ISDN/PLMN". See also section 5.5.6 for further reactions of the mobile station.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.1.5 Alerting

Having entered the "mobile originating call proceeding" state, upon receiving an indication that user alerting has been initiated at the called address, the call control entity of the network shall: send an ALERTING message to its peer entity at the calling mobile station and enter the "call delivered" state.

When the call control entity of the mobile station in the "call initiated" state or "mobile originating call proceeding" state receives an ALERTING message then, the call control entity of the mobile station shall stop timer T303 and T310 (if running) and shall enter the "call delivered" state. In this state, for speech calls:

- an alerting indication should be given to the user. If the mobile station has not attached the user connection then the mobile station shall internally generate an alerting indication. If the mobile station has attached the user connection then the network is responsible for generating the alerting indication and the mobile station need not generate one.

Abnormal cases:

On the mobile station side, if timer T310 expires, the call control entity of the mobile station shall initiate call clearing as described in section 5.4.



Figure 5.4/GSM 04.08
Call confirmation
at mobile originating call establishment

5.2.1.6 Call connected

Upon receiving an indication that the call has been accepted, the call control entity of the network shall: through connect the traffic channel (including the connection of an interworking function, if required) and send a CONNECT message to its peer entity at the calling mobile station; start timer T313 and enter the "connect indication" state.

This message indicates to the call control entity of the calling mobile station that a connection has been established through the network.

The call control entity of the mobile station in the "call initiated" state, in the "mobile originating call proceeding" state or in the "call delivered" state, shall, upon receipt of a CONNECT message:

- attach the user connection;
- return a CONNECT ACKNOWLEDGE message;
- stop any locally generated alerting indication (if applied);
- stop timer T303 and T310 (if running);
- enter the "active" state.

Abnormal cases:

On the mobile station side, if timer T303 or T310 expires, the call control entity of the mobile station shall initiate call clearing as described in section 5.4.

NOTE: The mobile station may have applied an additional internal alerting supervision which causes initiation of call clearing prior to the expiry of T303 or T310.

The call control of the network in the "connect indication" state, shall, upon receipt of a CONNECT ACKNOWLEDGE message:

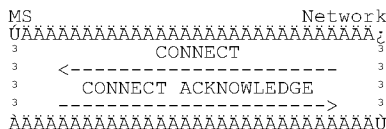
- stop timer T313 and enter the "active" state.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

Abnormal cases:

On the network side, if timer T313 elapses before a CONNECT ACKNOWLEDGE message has been received, the network shall perform the clearing procedure as described in section 5.4.



**Figure 5.5/GSM 04.08
Call acceptance sequence
at mobile originating call establishment**

5.2.1.7 Call rejection

Upon receiving an indication that the network or the called user is unable to accept the call, the network shall initiate call clearing at the radio interface to the mobile which originated the call, as described in section 5.4 using the cause provided by the terminating network or the called user.

5.2.1.8 Transit network selection

NOTE: For further study.

5.2.1.9 Traffic channel assignment at mobile originating call establishment

It is a network dependent decision when to initiate the assignment of an appropriate traffic channel during the mobile originating call establishment phase. Initiation of a suitable RR procedure to assign an appropriate traffic channel does neither change the state of a call control entity nor affect any call control timer.

NOTE: During certain phases of such an RR procedure, transmission of CC and MM messages may be suspended, see GSM 04.08, section 3 and GSM 08.08.

The assignment procedure does not affect any call control timer.

5.2.1.10 Call queuing at mobile originating call establishment

The conditions to apply queuing are described in GSM 03.01.

If an idle traffic channel is not available at the assignment instant, the network may place the traffic channel request in a queue. Calls arriving when all positions in the queue are occupied shall be cleared by the network using the cause #34 "no circuit/channel available".

The maximum queuing interval is supervised by the network. The limit is a network dependent choice. In case the network is not able to allocate a traffic channel within the queuing limit, the network will release the call using cause #34 "no circuit/channel available".

Optionally, e.g. if eMLPP is used, the network may decide to pre-empt existing calls or to place the traffic channel request at some preferential position within the queue.

Specific indications provided in the network to the remote user are a network dependent choice.

5.2.2 Mobile terminating call establishment

Before call establishment can be initiated in the mobile station, the MM connection must be established by the network.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.2.1 Call indication

After the arrival of a call from a remote user, the corresponding call control entity in the network shall: initiate the MM connection establishment according to section 4 and enter the "MM connection pending" state. The request to establish the MM connection is passed from the CM sublayer to the MM sublayer. It contains the necessary routing information derived from the SETUP message.

Upon completion of the MM connection, the call control entity of the network shall: send the SETUP message to its peer entity at the mobile station, start timer T303 and enter the "call present" state.

Upon receipt of a SETUP message, the mobile station shall perform compatibility checking as described in 5.2.2.2. If the result of the compatibility checking was compatibility, the call control entity of the mobile station shall enter the "call present" state. An incompatible mobile station shall respond with a RELEASE COMPLETE message in accordance with section 5.2.2.3.4.

If no response to the SETUP message is received by the call control entity of the network before the expiry of timer T303, the procedures described in section 5.2.2.3.3 shall apply.

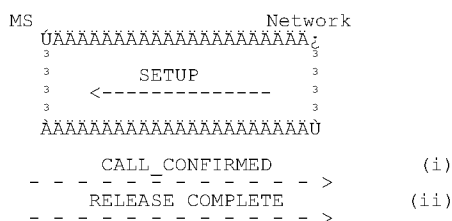


Figure 5.6/GSM 04.08
Mobile terminating call initiation and possible subsequent responses.

5.2.2.2 Compatibility checking

The mobile station receiving a SETUP message shall perform compatibility checking before responding to that SETUP message. Annex B defines compatibility checking to be performed by the mobile station upon receiving a SETUP message.

5.2.2.3 Call confirmation

5.2.2.3.1 Response to SETUP

Having entered the "call present state" the call control entity of the mobile station shall - with the exception of the cases described below - acknowledge the SETUP message by a CALL CONFIRMED message, and enter the "mobile terminating call confirmed" state.

The call control entity of the mobile station may include in the CALL CONFIRMED message to the network one or two bearer capability information elements to the network, either preselected in the mobile station or corresponding to a service dependent directory number (see GSM 09.07). The mobile station may also include one or two bearer capabilities in the CALL CONFIRMED message to define the radio channel requirements. In any case the rules specified in section 9.3.2.2 shall be followed.

NOTE: The possibility of alternative responses (e.g., in connection with supplementary services) is for further study.

A busy MS which satisfies the compatibility requirements indicated in the SETUP message shall respond either with a CALL CONFIRMED message if the call setup is allowed to continue or a RELEASE COMPLETE message if the call setup is not allowed to continue, both with cause #17 "user busy".

If the mobile user wishes to refuse the call, a RELEASE COMPLETE message shall be sent with the cause #21 "call rejected".

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

In the cases where the mobile station responds to a SETUP message with RELEASE COMPLETE message the mobile station shall release the MM connection and enter the "null" state after sending the RELEASE COMPLETE message.

The network shall process the RELEASE COMPLETE message in accordance with section 5.4.

5.2.2.3.2 Receipt of CALL CONFIRMED and ALERTING by the network

The call control entity of the network in the "call present" state, shall, upon receipt of a CALL CONFIRMED message: stop timer T303, start timer T310 and enter the "mobile terminating call confirmed" state.

The call control entity of the mobile station having entered the "mobile terminating call confirmed" state, if the call is accepted at the called user side, the mobile station proceeds as described in 5.2.2.5. Otherwise, if the signal information element was present in the SETUP message user alerting is initiated at the mobile station side; if the signal information element was not present in the SETUP message, user alerting is initiated when an appropriate channel is available.

Here, initiation of user alerting means:

- the generation of an appropriate tone or indication at the mobile station; and
- sending of an ALERTING message by the call control entity of the MS to its peer entity in the network and entering the "call received" state.

The call control entity of the network in the "mobile terminated call confirmed" state shall, upon receipt of an ALERTING message: send a corresponding ALERTING indication to the calling user; stop timer T310; start timer T301, and enter the "call received" state.

In the "mobile terminating call confirmed" state or the "call received" state, if the user of a mobile station is User Determined User Busy then a DISCONNECT message shall be sent with cause #17 "user busy". In the "mobile terminating call confirmed" state, if the user of a mobile station wishes to reject the call then a DISCONNECT message shall be sent with cause #21 "call rejected".

5.2.2.3.3 Call failure procedures

In case of abnormal behaviour the following call failure procedures apply:

- i. If the network does not receive any response to the SETUP message prior to the expiration of timer T303, then the network shall: initiate clearing procedures towards the calling user with cause #18 "no user responding"; and initiate clearing procedures towards the called mobile station in accordance with 5.4.4 using cause #102 "recovery on timer expiry".
- ii. If the network has received a CALL CONFIRMED message, but does not receive an ALERTING, CONNECT or DISCONNECT message prior to the expiration of timer T310, then the network shall:
 - initiate clearing procedures towards the calling user with cause #18 "no user responding"; and
 - initiate clearing procedures towards the called MS in accordance with section 5.4.4 using cause #102 "recovery on timer expiry".
- iii. If the network has received an ALERTING message, but does not receive a CONNECT or DISCONNECT message prior to the expiry of timer T301 (or a corresponding internal alerting supervision timing function), then the network shall: initiate clearing procedures towards the calling user with cause #19 "user alerting, no answer"; and initiate clearing procedures towards the called mobile station in accordance with section 5.4.4, using cause #102 "recovery on timer expiry" or using cause #31 "normal, unspecified".

NOTE: The choice between cause #31 and cause #102 may have consequences on indications generated by the mobile station, see GSM 02.40.

5.2.2.3.4 Called mobile station clearing during mobile terminating call establishment

See section 5.4.2.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.2.4 Notification of interworking in connection with mobile terminating call establishment

In this section, the term "interworking" is used only in the meaning of interworking with a network other than PLMN or ISDN, not as interworking between PLMN and ISDN since this is the normal case. In this sense, PLMN and ISDN are seen within the same environment, called the PLMN/ISDN environment.

During call establishment the call may enter an PLMN/ISDN environment, e.g., because of interworking with another network, with a non-PLMN/ISDN user, or with non-PLMN/ISDN equipment within the calling or called user's premises. When this occurs, the network may include a *progress indicator* information element to be included in the SETUP message to be sent to the called mobile station specifying progress description value

- a) #1 "call is not end-to-end PLMN/ISDN; further call progress information may be available in-band" or
- b) #3 "origination address is non-PLMN/ISDN".

See also section 5.5.1 for further reactions of the mobile station.

5.2.2.5 Call accept

In the "mobile terminating call confirmed" state or the "call received" state, the call control entity in the mobile station indicates acceptance of a mobile terminating call by:

- sending a CONNECT message to its peer entity in the network;
- starting Timer T313; and
- entering the "connect request" state.

5.2.2.6 Active indication

In the "mobile terminated call confirmed" state or in the "call received" state, the call control entity of the network shall, upon receipt of a CONNECT message: through connect the traffic channel (including the connection of an interworking function, if required), stop timers T310, T303 or T301 (if running); send a CONNECT ACKNOWLEDGE message to its peer entity at the mobile station of the called user; initiate procedures to send a CONNECT message towards the calling user and enter the "active" state.

In the "connect request" state, the call control entity of the mobile station shall, upon receipt of a CONNECT ACKNOWLEDGE message: stop timer T313 and enter the "active" state.

When timer T313 expires prior to the receipt of a CONNECT ACKNOWLEDGE message, the mobile station shall initiate clearing in accordance with section 5.4.3.

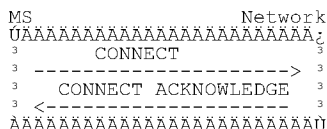


Figure 5.7/GSM 04.08
Call acceptance and active indication at mobile terminating call establishment

5.2.2.7 Traffic channel assignment at mobile terminating call establishment

It is a network dependent decision when to initiate the assignment of a traffic channel during the mobile terminating call establishment phase.

Initiation of the assignment phase does not directly change the state of a CC entity nor affect any call control timer, but may have some secondary effects (see e.g. clause 5.2.2.3.2).

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.2.8 Call queuing at mobile terminating call establishment

The principles described in section 5.2.1.10 apply accordingly.

NOTE: The interworking to the fixed network has to fulfil the network specific requirements.

5.2.2.9 User connection attachment during a mobile terminating call

For speech calls:

The mobile station shall attach the user connection at latest when sending the connect message.

For data calls:

The mobile station shall attach the user connection when receiving the CONNECT ACKNOWLEDGE message from the network.

5.2.3 Network initiated MO call S(CCBS)S

The procedures of section 5.2.3 are mandatory for mobile stations supporting "Network initiated MO call".

Note: the behaviour of a mobile station that does not support "Network initiated MO call" is described in section 4.

5.2.3.1 Initiation

Before call establishment can be initiated in the mobile station, the MM connection shall be established by the network.

After the arrival of an appropriate stimulus (for example a Remote User Free Indication), the corresponding call control entity in the network shall initiate the MM connection establishment according to section 4, enter the "CC connection pending" state and start timer T331. The request to establish the MM connection is passed from the CM sublayer to the MM sublayer. It contains the necessary routing information derived from the received stimulus.

Upon completion of the MM connection, the call control entity of the mobile station shall send a START CC message to its peer entity in the network. The mobile station shall then enter the "Wait for network information" state and start timer T332.

If the network receives a START CC message while in the "CC connection pending" state, the network stops T331, sends the CC-ESTABLISHMENT message, starts timer T333 and enters the "CC-establishment present" state.

The MM connection establishment may be unsuccessful for a variety of reasons, in which case the MM sublayer in the network will inform the CC entity in the network with an indication of the reason for the failure. The CC entity shall then stop all running timers, enter the "Null" state and inform all appropriate entities within the network.

If timer T331 expires, the network shall abort the MM connection establishment attempt, stop all running CC timers, enter the "Null" state and inform all appropriate entities within the network.

5.2.3.2 CC-Establishment present

In the "CC establishment present" state, the mobile station, upon receipt of the CC-ESTABLISHMENT message, shall stop timer T332.

The CC-ESTABLISHMENT message contains information which the mobile station shall use for the subsequent SETUP message (if any) related to this CC-ESTABLISHMENT.

The CC-ESTABLISHMENT message shall contain the *Setup Container IE*.

If no CC-ESTABLISHMENT message is received by the call control entity of the mobile station before the expiry of timer T332, then the mobile station shall initiate clearing procedures towards the network using a RELEASE COMPLETE message with cause #102 "recovery on timer expiry" and proceed in accordance with section 5.4.2.

Upon receipt of a CC-ESTABLISHMENT message the mobile station shall perform checks on the Setup Container IE in order to align the contained information with the mobile's present capabilities and configuration. The "recall alignment procedure" is defined later on in this section.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

If the recall alignment procedure has succeeded, the call control entity of the Mobile Station shall

- form and store the SETUP message for sending later in the "Recall present" state,
- acknowledge the CC-ESTABLISHMENT message with a CC-ESTABLISHMENT CONFIRMED message,
- start timer T335, and
- enter the "CC-establishment confirmed" state.

Exception:

A busy mobile station which has successfully performed the recall alignment procedure shall respond with a CC-ESTABLISHMENT CONFIRMED message with cause #17 "user busy", and proceed as stated above.

A mobile station, for which the recall alignment procedure failed, shall respond with a RELEASE COMPLETE message in accordance with section 5.4.2 with the appropriate cause code as indicated in the description of the recall alignment procedure.

The SETUP message is constructed from the *Setup Container IE* received in the CC ESTABLISHMENT MESSAGE. The mobile station shall assume that the *Setup Container IE* contains an entire SETUP message with the exception of the Protocol Discriminator, Transaction ID and Message Type elements. The mobile station may assume that the contents of the *Setup Container IE* are the same as were sent from the subscriber in a previous SETUP message of the mobile originating call establishment attempt. The mobile station shall copy the *Setup Container* to the SETUP message and not modify the contents except as defined in the recall alignment procedure and as defined in *exceptions* below. The mobile station shall not add other Information Elements to the end of the SETUP message.

Exceptions:

Bearer Capability IE(s), *HLC IE(s)* and *LLC (s) IE(s)* (including *Repeat Indicator(s)*, if there are 2 bearer capabilities) require handling as described in the recall alignment procedure below.

If the *CC Capabilities* in the *Setup Container IE* is different to that supported by the mobile station, the mobile station shall modify the *CC Capabilities* in the SETUP message to indicate the true capabilities of the mobile station.

Facility IE(s) and *SS Version IE(s)* require handling as described in the recall alignment procedure.

If no response to the CC-ESTABLISHMENT message is received by the call control entity of the network before the expiry of timer T333, then the network shall initiate clearing procedures towards the called mobile station using a RELEASE COMPLETE message with cause #102 "recovery on timer expiry" and inform all appropriate entities within the network, proceeding in accordance with section 5.4.2.

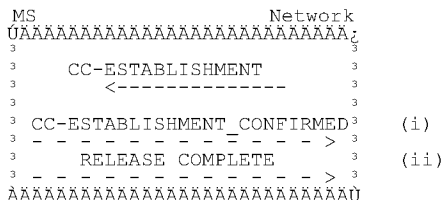


Figure 5.7a/GSM 04.08
Call initiation and possible subsequent responses.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.3.2.1 Recall Alignment Procedure

The recall alignment procedure consists of two parts :

- basic service group alignment, and
- facility alignment.

Basic service group alignment:

The mobile station shall check that the *Bearer Capability*, *HLC* and *LLC* and *Repeat Indicator* fields, which are embedded in the *Setup Container IE*, match a basic service group supported by the mobile station.

If this check fails, then the recall alignment procedure has failed. The mobile station shall use the cause #88 “incompatible destination” afterwards.

Otherwise, the mobile station is allowed to alter the content within the *Bearer Capability*, *HLC* and *LLC* Information Elements (e.g. the speech coder version(s), the data rate, the radio channel requirement) provided that the basic service group is not changed. The result shall be that the mobile station has derived *Bearer Capability*, *HLC* and *LLC* Information Elements, which it can use for a later call setup according to its configuration and capabilities.

Facility alignment:

This only applies if the *Setup Container* contains 1 or more *Facility IEs*. Each *Facility IE* within the *Setup Container* will be associated with the common *SS Version IE*, if present. The handling for each *Facility IE* is defined below. The mobile station shall align each *Facility IE* contained in the *Setup Container*. The rules defined in GSM 04.10 also apply.

The *Facility IE* is encoded as ‘simple recall alignment’, ‘advanced recall alignment’ or ‘recall alignment not essential’ (see GSM 04.10). If the encoding indicates, that

- a simple recall alignment is required, the mobile station shall copy the *Facility IE* and the common *SS version IE* from the *Setup Container* to the *SETUP* message without modifying the content.
- an advanced recall alignment is required, the mobile station must recognise and support the operation defined in the facility. If the mobile station does not recognise or support the operation, then the recall alignment procedure has failed and the mobile station shall use the cause #29 “facility rejected” in the subsequent rejection of the CC establishment request.
- the recall alignment is not essential, then the facility operation is not an essential part of the *SETUP*. If the MS does not recognise the operation then the *SS Version IE* and *Facility IE* are discarded, and NOT copied into the *SETUP* message.

NOTE. A mobile station may include a *Facility IE* without an associated *SS Version IE*. This would indicate that the SS operation is encoded using Phase 1 protocols.

Further details on Facility handling are given in GSM 04.105.2.3.3 CC-Establishment confirmation

The call control entity of the network in the “CC-establishment present” state, shall, upon receipt of a CC-ESTABLISHMENT CONFIRMED message, stop timer T333 and enter the “CC-establishmentconfirmed” state.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

In the "CC-establishment confirmed" state, the network sends a RECALL message. This message initiates user alerting and also shall include the Facility IE (providing additional information to be presented to the user for notification). The network starts timer T334 and enters the 'recall present' state.

Upon reception of the RECALL message the Mobile station stops T335 and enters the "recall present" state.

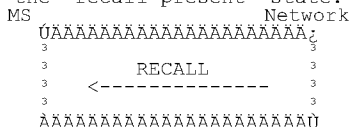


Figure 5.7b/GSM 04.08
Recall

5.2.3.4 Recall present

In the "recall present" state, the call control entity in the mobile station waits for acceptance of the Recall by the user. Once confirmation is received, the mobile station indicates acceptance of a recall by

- sending a SETUP message to its peer entity in the network;
- starting Timer T303; and
- entering the "call initiated" state and proceeding as described in section 5.2.1.1.

The MS shall ensure that the contents of the *Bearer Capability IE(s)* sent in the SETUP message are the same as the *Bearer Capability IE(s)* in the previous CC-ESTABLISHMENT CONFIRMED message related to this Network Initiated MO Call.

In the "recall-present" state, if the user of a mobile station is User Determined User Busy then a RELEASE COMPLETE message shall be sent with cause #17 "user busy" In the "recall-present" state. If the user of a mobile station wishes to reject the recall then a RELEASE COMPLETE message shall be sent with cause #21 "call rejected".

In either case, the mobile shall release the connection in accordance with section 5.4.2

On receipt of the SETUP message in the "recall present" state, the network shall stop timer T334 and proceed as specified in section 5.2.1.2.

If the call control entity of the network does not receive a SETUP message before the expiry of timer T334, then the network shall send a RELEASE COMPLETE message to the mobile using cause #102 "recovery on timer expiry", release the MM connection, enter the "null" state and shall inform all appropriate entities within the network.

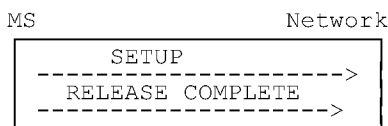


Figure 5.7b/GSM 04.08
Recall acceptance or rejection by user

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.2.3.5 Traffic channel assignment during network initiated mobile originating call establishment

It is a network dependent decision whether or not to initiate the assignment of a traffic channel during the "CC-establishment confirmed" state.

5.3 Signalling procedures during the "active" state

5.3.1 User notification procedure

The mobile terminating user notification procedure allows the network to notify a mobile station of any appropriate call-related event during the "active" state of a call. The procedure consists in the network sending a NOTIFY message to the mobile station. No state change occurs at any of the interface sides following the sending or the receipt of this message (but an appropriate indication may optionally be generated in the mobile station).

The mobile originating notification procedure allows the mobile station to notify the remote user of any appropriate call-related event during the "active" state of a call by sending a NOTIFY message containing a notification indicator to the network; upon receipt of this message, the network sends a NOTIFY message containing the same notify indicator to the other user involved in the call. No state change occurs at any of the interface sides following the sending or the receipt of this message.

5.3.2 Call rearrangements

Call rearrangements on the radio interface are not supported by explicit messages (e.g. SUSPEND and RESUME messages as defined in ETS 300 102-1). However if a remote non-PLMN user initiates call rearrangements, the network shall inform the mobile station by means of a NOTIFY message. In a similar way the mobile station can inform the network about rearrangements by sending a NOTIFY message (e.g. change of user equipment connected to the mobile station).

5.3.3 Not used

5.3.4 Support of Dual Services

The behaviour described in this section is used to realize the following required services throughout section 5.3.4. The mobile station is not obliged to support the network originated in-call modification procedure. In that case, the mobile station shall, when receiving a MODIFY message, treat the message as unknown and react as described in section 8.4. If the mobile station is already prepared to support the procedure in both directions, it shall act as described in this section.

- a) Alternate Speech/Data (BS 61 according to GSM 02.02);
- b) Speech followed by Data (BS 81 according to GSM 02.02);
- c) Alternate Speech/Group 3 fax (Teleservice 61 according to GSM 02.03).

5.3.4.1 Service Description

This circuit switched service allows the two users on a point-to-point connection to use the connection between them for different information transfer during the same call, but not at the same time.

If the negotiation during call establishment leads to the recognition of the above mentioned services, the in-call modification procedure is allowed to be executed within the current call by changing from one call mode to the other.

In some cases the in-call modification procedure makes it necessary to change the channel configuration by allocating a new channel and in other cases to change channel configuration parameters while keeping the previously allocated channel. This change is determined by the network, which initiates either the channel assignment procedure, handover procedure or channel mode modify procedure (see section 3).

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

The capability and the initial mode desired must be identified by the mobile station by identifying each mode of operation with a separate information element during call establishment. Further the type of change between the modes must be identified by means of the repeat indicator:

mode 1 "alternate" mode 2; or

mode 1 "and then" mode 2.

5.3.4.2 Call establishment

For both mobile originating and mobile terminating calls, the normal call establishment procedures apply.

5.3.4.2.1 Mobile Originating Establishment

The service is requested by the originating mobile station by transferring a SETUP message to the network containing the *BC repeat indicator* IE, the *bearer capability 1* information element, and the *bearer capability 2* information element. The first mode of operation ("call mode") shall be indicated by the *bearer capability 1* information element and the second call mode by the *bearer capability 2* information element.

A low layer compatibility may optionally be specified for each call mode in a *low layer compatibility I* and *low layer compatibility II* information element. In that case:

- the SETUP message shall contain the *LLC repeat indicator* IE and both *low layer compatibility I* and *low layer compatibility II* information elements. The *low layer compatibility I* information element then corresponds to the *bearer capability 1* information element and the *low layer compatibility II* information element to the *bearer capability 2* information element;
- if no low layer compatibility specification applies for one of the two call modes, the corresponding low layer compatibility IE (*low layer compatibility I* or *low layer compatibility II*) shall indicate "not applicable";
- the *LLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

Similarly, a high layer compatibility may optionally be specified for each call mode in a *high layer compatibility i* and *high layer compatibility ii* information element. In that case:

- the SETUP message shall contain the *HLC repeat indicator* IE and both *high layer compatibility i* and *high layer compatibility ii* information elements. The *high layer compatibility i* information element then corresponds to the *bearer capability 1* information element and the *high layer compatibility ii* information element to the *bearer capability 2* information element;
- if no high layer compatibility specification applies for one of the two call modes, the corresponding high layer compatibility IE (*high layer compatibility i* or *high layer compatibility ii*) shall indicate "not applicable";
- the *HLC repeat indicator* shall specify the same repeat indication as the *BC repeat indicator* IE.

The receiving entity shall ignore whether the *LLC repeat indicator* IE or *HLC repeat indicator* are contained in the message or not; it shall also ignore the repeat indication of an *LLC repeat indicator* IE or *HLC repeat indicator* IE. If the *low layer compatibility II* IE is not contained in the message and the *low layer compatibility I* IE is contained in the message, the receiving entity shall relate it to a call mode indicated in the message that does not specify speech (if any). If the *high layer compatibility ii* IE is not contained in the message and the *high layer compatibility i* IE is contained in the message, the receiving entity shall relate it to a call mode indicated in the message that does not specify speech (if any).

The specific part of the network which is sensitive to the call mode shall examine each mode described in the bearer capabilities included in the SETUP message by performing compatibility checking as defined in Annex B. If as a result of this compatibility checking the network decides to reject the call, then the network shall initiate call clearing as specified in section 5.4 with the following causes:

- a) #57 "bearer capability not authorized"
- b) #58 "bearer capability not presently available"
- c) #65 "bearer service not implemented"

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

- d) #70 "only restricted digital information bearer capability is available"

5.3.4.2.2 Mobile Terminating Establishment

The service is indicated to the called mobile station by a SETUP message coded in the same manner as in the mobile originating call establishment. As specified for normal terminating call establishment, the service may be indicated by the called mobile station in the CALL CONFIRMED message.

The destination mobile station shall perform the compatibility checking as defined in Annex B for both required modes if indicated in the SETUP message. If as a result of compatibility checking the mobile station decides to reject the call, the mobile station shall initiate call clearing according to the procedures of section 5.4 with one of the following causes:

- a) #57 "bearer capability not authorized"
- b) #58 "bearer capability not presently available"
- c) #65 "bearer service not implemented"
- d) #88 "incompatible destination"

The mobile station may accept the call if the first mode indicated is free irrespective of whether the other mode is free or busy.

5.3.4.3 Changing the Call Mode

In order to change the call mode, the following in-call modification procedures shall be used.

Either side of the radio interface may act as the requesting user to invoke the in-call modification.

Upon each successful completion of the in-call modification procedure, the call changes to the next mode negotiated and agreed during the establishment phase of the call.

The in-call modification procedures are completely symmetrical at the radio interface.

NOTE: Considering a possible future evolution, in-call modification is specified as a symmetrical procedure.

5.3.4.3.1 Initiation of in-call modification

The procedure is initiated by the requesting originating side in the "active" state of the call. It shall send a MODIFY message including the new mode to be changed to; start timer T323; and enter the "mobile originating modify" state (mobile station side) or the "mobile terminating modify" state (network side). Any internal resources necessary to support the next call mode shall be reserved. The new mode given in the MODIFY message shall be one of those already negotiated and agreed during the establishment phase of the call. If the data call direction is different from the direction of the call setup a reverse call setup direction IE shall be included in the MODIFY message; otherwise this IE shall not be included. The MODIFY originating side shall stop sending Bm-channel information; and stop interpreting received Bm-channel information according to the old call mode.

Upon receipt of the MODIFY message, the destination side shall check to ensure that the requested call mode can still be supported and if so, it shall initiate the reservation of any resources necessary to support the next call mode and enter the "mobile originating modify" (network side) or "mobile terminating modify" state (mobile station side).

5.3.4.3.2 Successful completion of in-call modification

If the destination network/mobile station receives a MODIFY message with a new mode which is already the actual one of the call the network/mobile station shall remain in the "active" state; send a MODIFY COMPLETE message with the actual mode; and shall not initiate anything else.

If the requested mode is not the actual one and can be supported by the destination interface it shall change the channel configuration, if required, and step on to any internal resources necessary to support the next call mode. If the requested mode is a data or facsimile mode, it shall also perform the appropriate means to take the direction of the data call into account. After successful change of the channel configuration it shall start sending user information according to the next call mode and start interpreting received user channel information according to the next call mode; send a

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

MODIFY COMPLETE message with the new call mode included and enter the "active" state (mobile station or network side). If the MODIFY message had contained a *reverse call setup direction* IE, the same IE shall be included in the MODIFY COMPLETE message.

In case of an alternate speech/data or alternate speech/facsimile group 3 service (refer to section 5.3.4) the old resources may still be kept reserved, in case of speech followed by data service they may be released.

Upon receipt of the MODIFY COMPLETE message the originating side shall: initiate the alternation to those resources necessary to support the next call mode; stop timer T323; and enter the "active" state (mobile station or network side). The reaction of the originating side if it had included a reverse call setup direction IE in the MODIFY message, but the destination side did not include the IE in the MODIFY COMPLETE message is implementation dependent.

5.3.4.3.3 Change of the channel configuration

In case the requested bearer capability cannot be supported by the current channel configuration the network shall initiate the assignment procedure and change the channel configuration accordingly.

5.3.4.3.4 Failure of in-call modification

5.3.4.3.4.1 Network rejection of in-call modification

If the network cannot support the change to the requested call mode or if the change of the channel configuration fails the network shall: release the resources which had been reserved for the alternation: send a MODIFY REJECT message with the old bearer capability and with cause # 58 "bearer capability not presently available" to the initiating mobile station; and enter the "active" state. If the change of the channel configuration fails, the network shall return to the internal resources required for the old call mode.

Upon receipt of the MODIFY REJECT message with the old bearer capability the initiating mobile station shall: stop timer T323; release any resources which had been reserved for the alternation; resume sending user channel information according to the present call mode; resume interpreting received user channel information according to the present call mode; and enter the "active" state.

5.3.4.3.4.2 Mobile station rejection of in-call modification

If the mobile station cannot support the change to the requested call mode, the mobile station shall: release any resources which had been reserved for the alternation; send a MODIFY REJECT message with the old bearer capability and cause # 58 "bearer capability not presently available", and enter the "active" state.

Upon receipt of the MODIFY REJECT message the network shall: stop timer T323, release any resources which had been reserved for the alternation.

5.3.4.3.4.3 Time-out recovery

Upon expiration of T323 in either the mobile station or the network the procedures for call clearing shall be initiated with cause # 102 "recovery on timer expiry".

5.3.4.4 Abnormal procedures

If a MODIFY, MODIFY COMPLETE or MODIFY REJECT message is received in the "disconnect indication", "disconnect request" (mobile station side only) or "release request" state then the received message shall be discarded and no action shall be taken.

If a MODIFY COMPLETE message indicating a call mode which does not correspond to the requested one is received or if a MODIFY REJECT message indicating a call mode which does not correspond to the actual one is received then the received message shall be discarded and no action shall be taken.

If a MODIFY message indicating a call mode which does not belong to those negotiated and agreed during the establishment phase of the call, is received, then a MODIFY REJECT message with the actual call mode and with cause # 57 "bearer capability not authorized" shall be sent back.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

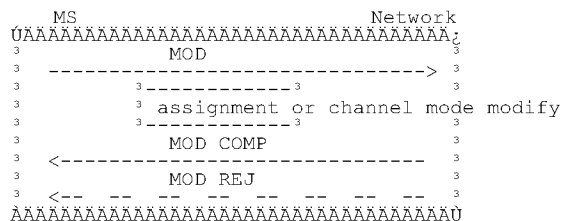


Figure 5.10a/GSM 04.08
In-call modification sequence initiated by MS

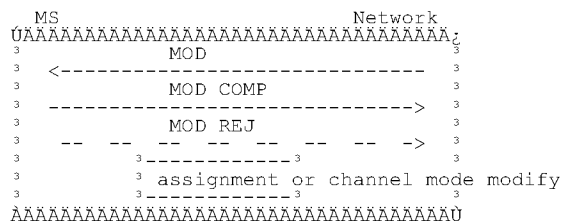


Figure 5.10b/GSM 04.08
In-call modification sequence initiated by network

5.3.5 User initiated service level up- and downgrading

The user initiated service level up- and downgrading is applicable for non-transparent multislot data services, only. By means of this procedure the user can request a change of the "maximum number of traffic channels" and/or "wanted air interface user rate" parameters, to be assigned by the network.

5.3.5.1 Initiation of service level up- and downgrading

The procedure is initiated by the mobile station in the "active" state of the call. It shall:

- send a MODIFY message including the wanted value of the "maximum number of traffic channels" and/or the "wanted air interface user rate" parameters;
- not change any of the other, possibly negotiated, parameters of the bearer capability information element;
- start timer T323; and
- enter the "mobile originating modify" state.

Any internal resources necessary to support the next service parameters shall be reserved. If a dual service was negotiated at call setup, the mobile station shall initiate the service level up- or down-grading only during the data phase of the dual service.

Upon receipt of the MODIFY message, the network shall check if the indicated maximum number of traffic channels can be supported and enter the "mobile originating modify" state.

5.3.5.2 Successful completion of service level up- and downgrading

The network may upon reception of the MODIFY message initiate a change of the channel configuration assigned to the mobile station.

As a response to the MODIFY message the network sends a MODIFY COMPLETE message including the bearer capability negotiated at call setup and enters the "active" state.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

Upon receipt of the MODIFY COMPLETE message the mobile station shall stop timer T323 and enter the "active" state.

5.3.5.3 Rejection of service level up- and downgrading

If a change of bearer service is requested together with a change of the "maximum number of traffic channels" and/or the "wanted air interface user rate", or if the current used service is not a data service where up- and downgrading is applicable, or if the receiver chooses not to grant the request, the network shall:

- send a MODIFY REJECT message with bearer capability negotiated at call setup and with cause #58 "bearer capability not presently available";
- enter the "active" state.

Upon receipt of the MODIFY REJECT message with the bearer capability negotiated at call setup, the mobile station shall: stop timer T323 and enter the "active" state.

5.3.5.4 Time-out recovery

Upon expiration of T323 in the mobile station the procedures for call clearing shall be initiated with cause #102 "recovery on timer expiry".

5.4 Call clearing

5.4.1 Terminology

The following terms are used in this Technical Specification in the description of clearing procedures:

- A traffic channel (see GSM 04.03) is "connected" when the channel is part of a circuit-switched connection established according to this Technical Specification.
- A traffic channel is "disconnected" when the channel is no longer part of a circuit-switched connection, but is not yet available for use in a new connection.

5.4.2 Exception conditions

Under normal conditions, the call control entity of the mobile station or of the network initiates call clearing by sending a DISCONNECT message to its peer entity; then both entities follow the procedures defined in sections 5.4.3 and 5.4.4 respectively.

As an exception to the above rule, the call control entity of the mobile station or of the network, in response to a SETUP or START CC or CC-ESTABLISHMENT CC-

ESTABLISHMENT CONFIRMED or RECALL message, can reject a call by stopping all running call control timers, responding with a RELEASE COMPLETE message, releasing the MM connection, and returning to the "null" state, provided no other response has previously been sent.

As a further exception, the call control entity of the network may initiate call clearing by stopping all running call control timers, sending a RELEASE message, starting timer T308, and entering the "release request" state.

NOTE: This way to initiate call clearing by sending a RELEASE message should not be used by the network:

- if in-band tones/announcements are provided and the network decides to use the procedure described in section 5.4.4.1;
- if the network wants to have the opportunity to respond to information sent by the mobile station during call clearing.

A call control entity shall accept an incoming RELEASE COMPLETE message used to initiate the call clearing even though the cause information element is not included.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

A control entity shall accept an incoming RELEASE message used to initiate the call clearing even though the cause information element is not included.

Furthermore, a call control entity shall regard an incoming RELEASE COMPLETE message as consistent with any of its states; a call control entity shall regard an incoming RELEASE message as consistent with any of its states except the null state; a call control entity of the mobile station shall regard an incoming DISCONNECT message as consistent with any of its call control states except the "null" state, the "release request" state, and the "disconnect indication" state; a call control entity of the network shall regard an incoming DISCONNECT message as consistent with any of its call control states except the "null" state and the "release request" state.

NOTE: This allows the introduction of shorter call clearing procedures in the future.

5.4.3 Clearing initiated by the mobile station

5.4.3.1 Initiation of call clearing

Apart from the exceptions identified in section 5.4.2, the call control entity of the mobile station shall initiate clearing by: stopping all running call control timers, sending a DISCONNECT message; starting timer T305; and entering the "disconnect request" state.

5.4.3.2 Receipt of a DISCONNECT message from the mobile station.

The call control entity in the network in any state except the "null" state and the "release request" state shall, upon receipt of a DISCONNECT message:

- Stop all running call control timers;
- initiate procedures to clear the network connection and the call to the remote user;
- send a RELEASE message to its peer entity;
- start timer T308; and
- enter the "release request" state.

NOTE: The RELEASE message has only local significance and does not imply an acknowledgement of clearing from the remote user.

5.4.3.3 Receipt of a RELEASE message from the network

The call control entity of the mobile station in any state except the "null" state and the "release request" state, shall, upon receipt of a RELEASE message: stop all running call control timers; send a RELEASE COMPLETE message; release the MM connection; and return to the "null" state.

5.4.3.4 Receipt of a RELEASE COMPLETE message from the mobile station

A call control entity of the network in any call control state shall, upon receipt of a RELEASE COMPLETE message from its peer entity in the mobile station: stop all running call control timers; release the MM connection; and return to the "null" state.

5.4.3.5 Abnormal cases

The call control entity of the mobile station in the "disconnect request" state, shall upon expiry of timer T305: send a RELEASE message to the network with the cause number originally contained in the DISCONNECT message and optionally, a second cause information element with cause #102 "recovery on timer expiry", start timer T308, and enter the "release request" state.

The call control entity of the network in the "release request" state, shall, at first expiry of timer T308, retransmit the RELEASE message, start timer T308, and stay in the "release request" state. At second expiry of timer T308, the call control entity of the network shall: release the MM connection; and return to the "null" state.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.4.4 Clearing initiated by the network

Apart from the exception conditions identified in section 5.4.2, the call control entity of the network shall initiate clearing by: sending a DISCONNECT message; and entering the "disconnect indication" state. The DISCONNECT message is a local invitation to clear the call.

NOTE: When the network initiates clearing by sending a RELEASE message, the procedures described in sections 5.4.3., 5.4.3.4 and 5.4.3.5 are followed.

5.4.4.1 Clearing when tones/announcements provided

When in-band tones/announcements are provided (see section 5.5.1), the call control entity of the network may initiate clearing by sending a DISCONNECT message containing progress indicator #8 "in-band information or appropriate pattern now available", starting timer T306, and entering the "disconnect indication" state.

5.4.4.1.1 Receipt of a DISCONNECT message with progress indicator #8 from the network

The call control entity of the MS in any state except the "null" state, the "disconnect indication" state, and the "release request" state, shall, upon receipt of a DISCONNECT message with progress indicator #8:

- i) if an appropriate speech traffic channel is not connected, continue clearing as defined in section 5.4.4.2.1 without connecting to the in-band tone/announcement;
- ii) if an appropriate speech traffic channel is connected, attach the user connection for speech if it is not yet attached and enter the "disconnect indication" state. In that state, if upper layers request the clearing of the call, the call control entity of the MS shall proceed as defined in section 5.4.4.2.1.

5.4.4.1.2 Expiry of timer T306

The call control entity of the network, having entered the "disconnect indication" state after sending a disconnect message with the progress indicator #8, shall, upon expiry of timer T306, continue clearing by sending a RELEASE message with the cause number originally contained in the DISCONNECT message; starting timer T308; and entering the "release request" state.

5.4.4.2 Clearing when tones/announcements not provided

When in-band tones and announcements are not provided, the call control entity of the network shall initiate call clearing by stopping all running call control timers, sending a DISCONNECT message without progress indicator, starting timer T305 and entering the "disconnect indication" state.

5.4.4.2.1 Receipt of a DISCONNECT message without progress indicator or with progress indicator different from #8 from the network

The call control entity of the mobile station in any state except the "null" state, the "disconnect indication" state, and the "release request" state, shall, upon the receipt of a DISCONNECT message without progress indicator information element or with progress indicator different from #8:

- stop all running call control timers;
- send a RELEASE message;
- start timer T308; and
- enter the "release request" state.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.4.4.2.2 Receipt of a RELEASE message from the mobile station

The call control entity of the network in any state except the "null" state and the "release request" state, shall, upon receipt of a RELEASE message: stop all running call control timers; send a RELEASE COMPLETE message; release the MM connection; and return to the "null" state.

5.4.4.2.3 Abnormal cases

The call control entity of the network, having entered the "disconnect indication" state after sending a DISCONNECT message without progress indicator or with progress indicator different from #8, shall upon expiry of timer T305: send a RELEASE message to the mobile station with the cause number originally contained in the DISCONNECT message; start timer T308; and enter the "release request" state. In addition to the original clearing cause, the RELEASE message may contain a second cause information element with cause #102 "recovery on timer expiry".

5.4.4.3 Completion of clearing

A call control entity of the mobile station in any call control state shall, upon receipt of a RELEASE COMPLETE message from its peer entity in the network: stop all running call control timers; release the MM connection; and return to the "null" state.

5.4.4.3.1 Abnormal cases

The call control entity of the mobile station in the "release request" state shall at first expiry of timer T308 retransmit the RELEASE message and restart timer T308. At second expiry of timer T308, the call control entity of the mobile station shall: release the MM connection; and return to the "null" state.

5.4.5 Clear collision

Clear collision occurs when both the mobile station and the network simultaneously transfer DISCONNECT messages specifying the same call.

The behaviour of the network call control entity receiving a DISCONNECT message whilst in the "disconnect indication" state is specified in section 5.4.3. The behaviour of the MS call control entity receiving a DISCONNECT message whilst in the "disconnect request" state is defined in section 5.4.4.

Clear collision can also occur when both sides simultaneously transfer RELEASE messages related to the same call. The entity receiving such a RELEASE message whilst within the "release request" state shall: stop timer T308; release the MM connection; and enter the "null" state (without sending a RELEASE COMPLETE message).

5.5 Miscellaneous procedures

5.5.1 In-band tones and announcements

When the network wants to make the mobile station attach the user connection (e.g. in order to provide in-band tones/announcement) before the mobile station has reached the "active" state of a call, the network may include a *progress indicator* IE indicating user attachment in a suitable CC message:

- Either it includes the IE in a SETUP, CALL PROCEEDING, ALERTING, or CONNECT message that is sent during call establishment
- it sends a PROGRESS message containing the IE.

A *progress indicator* IE indicates user attachment if it specifies a progress description in the set {1, 2, 3} or in the set {6, 7, 8, ..., 20}.

On reception of a SETUP, CALL PROCEEDING, ALERTING, CONNECT, or PROGRESS message the mobile station shall proceed as specified elsewhere in section 5; if the *progress indicator* IE indicated user attachment and a speech mode traffic channel is appropriate for the call the mobile station shall in addition: attach the user connection for

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

speech as soon as an appropriate channel in speech mode is available. (If a new order to attach the user connection is received before the attachment has been performed, the new order shall supersede the previous one.)

Under certain conditions the MS will have to attach the user connection before the CONNECT message. It is up to the network to ensure that no undesired end-to-end through connection takes place during the establishment of a MT call.

NOTE: This allows the use of *progress indicator* IEs independently from the channel modes appropriate for the call.

5.5.2 Call collisions

Call collisions as such cannot occur at the network. Any simultaneous mobile originating or mobile terminating calls are dealt with separately assigned and different transaction identifiers.

5.5.3 Status procedures

5.5.3.1 Status enquiry procedure

Whenever a call control entity wishes to check the call state of its peer entity, it may initiate the status enquiry procedure.

NOTE: This may, in particular, apply to procedural error conditions described in section 8.

A call control entity initiates the status enquiry procedure by sending the STATUS ENQUIRY message and starting timer T322. While timer T322 is running, the call control entity shall not send further STATUS ENQUIRY messages.

Upon receipt of a STATUS ENQUIRY message, the receiver shall respond with a STATUS message, reporting the current call state and cause value #30 "response to STATUS ENQUIRY". Receipt of the STATUS ENQUIRY shall not result in a state change relating to any protocol and connection of the receiver.

If a STATUS message is received that contains cause value #30 "response to status enquiry", timer T322 shall be stopped and further appropriate actions taken, based on the information in that STATUS message, relative to the current state of the receiver of the STATUS message. These further "appropriate actions" are implementation dependent. However, the actions prescribed in section 5.5.3.2 shall apply.

If a clearing message is received while timer T322 is running, timer T322 shall be stopped, and call clearing shall continue.

If timer T322 expires, the STATUS ENQUIRY message may be retransmitted maximally once. If T322 expires after the STATUS ENQUIRY has been transmitted the maximum number of times, clearing of the call shall be initiated with cause value #41, "temporary failure", in the first call clearing message.

5.5.3.2 Reception of a STATUS message by a CC entity

5.5.3.2.1 STATUS message with incompatible state

On receipt of a STATUS message reporting an incompatible call control state, the receiving entity shall clear the call by sending a RELEASE COMPLETE message with cause # 101 "message not compatible with protocol state". The reported call control state is incompatible if the combination of call control states at the sender and receiver side cannot occur, do not match or cannot be aligned by actions of the receiver; the exact definition is implementation dependent.

5.5.3.2.2 STATUS message with compatible state

A STATUS message may be received indicating a compatible call state but containing one of the following causes:

- # 95 "semantically incorrect message"; or
- # 96 "invalid mandatory information"; or
- # 97 "message type non-existent or not implemented"; or

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

- # 98 "message type not compatible with protocol state"; or
- # 99 "information element non-existent or not implemented"; or
- # 100 "conditional IE error",

This indicates that the transmitter of the STATUS message was unable to accept some information sent by the recipient of the STATUS message. This allow the recipient to retransmit some or all of the information. Other actions are possible and are implementation dependent; they may include releasing the call.

5.5.4 Call re-establishment, mobile station side

This section describes the internal handling in the mobile station as far as call control is concerned.

5.5.4.1 Indication from the mobility management sublayer

When a MM connection is active, an indication may be given by the MM sublayer to the call control entity to announce that the current MM connection has been interrupted but might be re-established on request of call control.

5.5.4.2 Reaction of call control

Depending whether call re-establishment is allowed or not and on its actual state, call control shall decide to either request re-establishment or to release the MM connection.

a) Re-establishment not required

If the call is in the call establishment or call clearing phase, i.e. any state other than the "active" state or the "mobile originating modify" state, call control shall release the MM connection

b) Re-establishment required

If the call is in the "active" state or "mobile originating modify" state, the indication from MM that re-establishment is possible shall cause call control to request re-establishment from the MM connection, suspend any further message to be sent and await the completion of the re-establishment procedure.

5.5.4.3 Completion of re-establishment

Call Control is notified when the MM connection is re-established and shall then resume the transmission of possibly suspended messages and resume user data exchange when an appropriate channel is available.

5.5.4.4 Unsuccessful outcome

If the attempt to re-establish the connection was unsuccessful, the MM connection will be released and a release indication will be given to call control, see 4.5.1.6.

5.5.5 Call re-establishment, network side

This section describes the handling in the network as far as call control is concerned.

5.5.5.1 State alignment

After a successful call re-establishment it is a network responsibility to identify (e.g. by using the status enquiry procedure, if needed, and resolve, if possible, any call state or auxiliary state mismatch between the network and the mobile station.

5.5.6 Progress

At any time during the establishment or release of a call and during an active call the network may send a PROGRESS message to the mobile station.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

On receipt of a PROGRESS message during the establishment or release of a call the mobile station shall stop all call control timers related to that call.

NOTE: If the PROGRESS has been received before the receipt of a CALL PROCEEDING message, the mobile station will not start timer T310 on receipt of a CALL PROCEEDING message, see section 5.2.1.1.3.

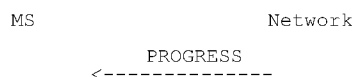


Figure 5.11/GSM 04.08
Progress

5.5.7 DTMF protocol control procedure

Dual Tone Multi Frequency (DTMF) is an inband one out of four plus one out of four signalling system primarily used from terminal instruments in telecommunication networks. The support of DTMF in the network is described in GSM 03.14.

The mobile station shall be capable of transmitting DTMF messages if and only if the mobile station has the user connection for speech attached and an appropriate channel is available.

The transaction identifier used by the DTMF messages shall be that of the attached speech call.

NOTE 1: This specification means that DTMF messages can generally be sent in the active state of a call in speech transmission mode or when a traffic channel is available during setup or release and the *progress indicator* IE has been received.

NOTE 2: Since the DTMF protocol messages are sent in a store and forward mode on the signalling channels the control of the device at the far end may be delayed dependent on the load or quality of the channels.

NOTE 3: The procedures described in this paragraph support DTMF only in the direction mobile station to network.

5.5.7.1 Start DTMF request by the mobile station

A user may cause a DTMF tone to be generated e.g. by depression of a key in the mobile station. The relevant action is interpreted by the mobile station as a requirement for a DTMF digit to be sent in a START DTMF message on an established FACCH. This message contains the value of the digit to be transmitted (0, 1, ..., 9, A, B, C, D, *, #).

Only a single digit will be transferred in each START DTMF message.

5.5.7.2 Start DTMF response by the network

Upon receiving the START DTMF message the network will reconvert the received digit back into a DTMF tone which is applied toward the remote user and returns a START DTMF ACKNOWLEDGE message to the mobile station. This acknowledgement may be used in the mobile station to generate an indication as a feedback for a successful transmission.

If the network cannot accept the START DTMF message a START DTMF REJECT message will be sent to the mobile station.

5.5.7.3 Stop DTMF request by the mobile station

When the user indicates that the DTMF sending should cease e.g. by releasing the key the mobile station will send a STOP DTMF message to the network.

5.5.7.4 Stop DTMF response by the network

Upon receiving the STOP DTMF message the network will stop sending the DTMF tone and return a STOP DTMF ACKNOWLEDGE message to the mobile station.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

5.5.7.5 Sequencing of subsequent start DTMF requests by the mobile station

The minimum length of tone generated by the network should be according to CEPT recommendation T/CS 46-02.

The minimum gap between two subsequent tones should be according to CEPT recommendation T/CS 46-02.

There is no defined maximum length to the tone, which will normally cease when a STOP DTMF message is received from the MS. However, the operator may choose to put a pre-defined time limit on the duration of tones sent.

The appropriate sequencing of DTMF control messages is shown in figures 5.8 and 5.9.

NOTE 1: The network may implement the time limit option where the DTMF tone duration is controlled by the network irrespective of the receipt of a STOP DTMF message from the mobile station.

NOTE 2: The transmission time of the messages over the radio interface on FACCH/F or FACCH/H, see GSM 05.02, ensures that the minimum length of tones and minimum gap between tones according to T/CS 46-02 are fulfilled.

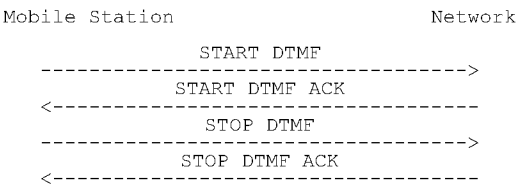


Figure 5.8/GSM 04.08
Single DTMF transmission

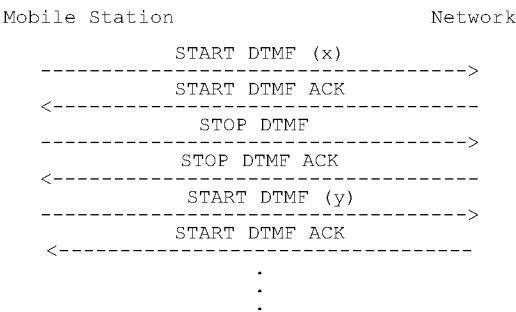


Figure 5.9/GSM 04.08
Multiple DTMF transmission

6 Support for packet services

This chapter contains the description of the procedures for the session management of GPRS point-to-point data services at the radio interface (Reference point U_m).

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

6.1 GPRS Session management

6.1.1 General

The main function of the session management (SM) is to support PDP context handling of the user terminal. The SM comprises procedures for

- non-anonymous PDP context activation, deactivation and modification; and
- anonymous PDP context activation and deactivation.

SM procedures for non-anonymous access can only be performed if a GMM context has been established between the MS and the network. If no GMM context has been established, the MM sublayer has to initiate the establishment of a GMM context by use of the GMM procedures as described in chapter 4. After GMM context establishment, SM uses services offered by GMM (see GSM 04.07 [20]). Ongoing SM procedures are suspended during GMM procedure execution.

For anonymous access no GMM context is established.

6.1.2 Session management states

In this section, the SM states are described for one SM entity (see GSM 04.07 [20]). Each SM entity is associated with one PDP context. Section 6.1.2.1 describes the SM states in the MS and section 6.1.2.2 describes the SM states on the network side.

6.1.2.1 Session management states in the MS

In this section, the possible states of an SM entity in the mobile station are described. As illustrated in figure 6.1/GSM 0408 there are four SM states in the MS.

6.1.2.1.1 PDP-INACTIVE

This state indicates that no PDP context exists.

6.1.2.1.2 PDP-ACTIVE-PEND

This state exists when PDP context activation was requested by the MS.

6.1.2.1.3 PDP-INACTIVE-PEND

This state exists when deactivation of the PDP contexts was requested by the MS.

6.1.2.1.4 PDP-ACTIVE

This state indicates that the PDP context is active.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

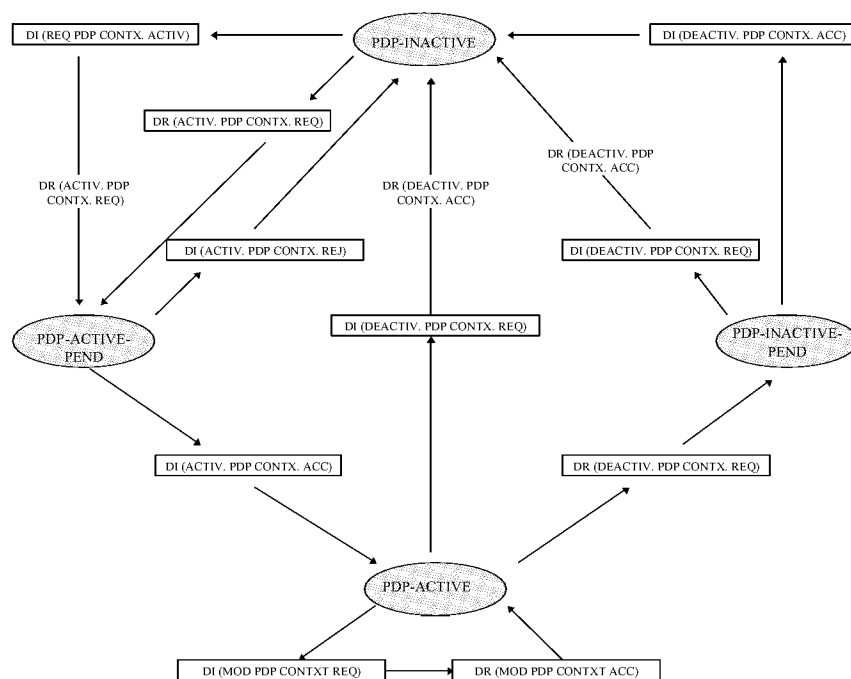


Figure 6.1/GSM 0408: Session management states in the MS

6.1.2.2 Session management states on the network side

In this section, the possible states of an SM entity on the network side are described. As illustrated in figure 6.2/GSM 0408 there are five SM states on the network side.

6.1.2.2.1 PDP-INACTIVE

This state indicates that the PDP context is not active.

6.1.2.2.2 PDP-ACTIVE-PEND

This state exists when the PDP context activation was initiated by the network.

6.1.2.2.3 PDP-INACTIVE-PEND

This state exists when deactivation of the PDP context was requested by the network.

6.1.2.2.4 PDP-ACTIVE

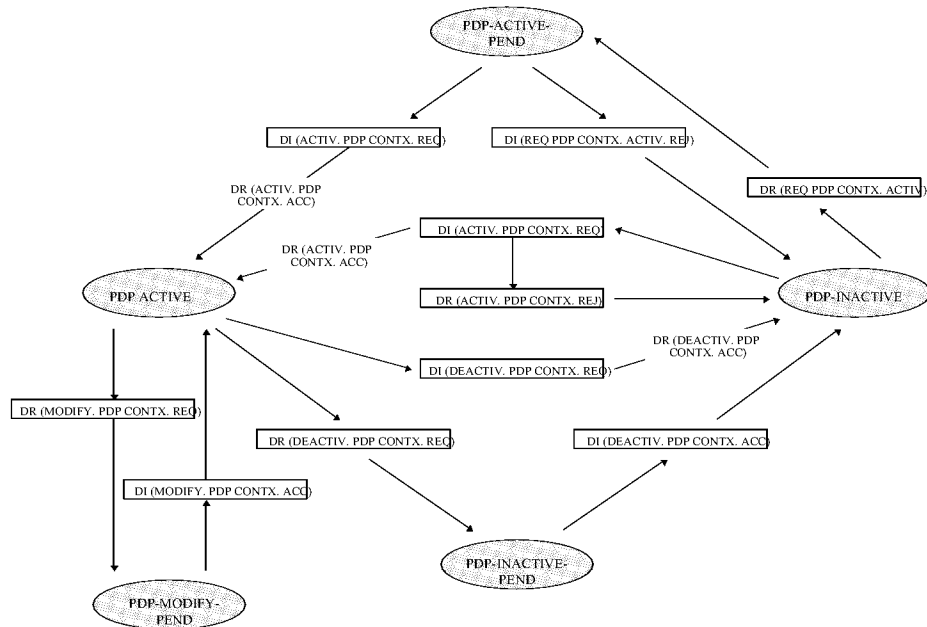
This state indicates that the PDP context is active.

6.1.2.2.5 PDP-MODIFY-PEND

This state exists when modification of the PDP context was requested by the network.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)



DR: GMM-SM-DATA-REQUEST (Message), i.e. message sent by network
DI: GMM-SM-DATA-INDICATION (Message), i.e. message received by the network

Figure 6.2/GSM 0408: Session management states on the network side

6.1.3 Session Management procedures

6.1.3.1 PDP context activation

The purpose of this procedure is to establish a PDP context between the MS and the network for a specific QoS on a specific NSAPI. The PDP context activation may be initiated by the MS or the initiation may be requested by the network.

6.1.3.1.1 Successful PDP context activation initiated by the mobile station

In order to request a PDP context activation, the MS sends an ACTIVATE PDP CONTEXT REQUEST message to the network, enters the state PDP-ACTIVE-PEND and starts timer T3380. The message shall contain the PDP activation direction IE indicating "MS initiated PDP".

Upon receipt of an ACTIVATE PDP CONTEXT REQUEST message, the network shall reply with an ACTIVATE PDP CONTEXT ACCEPT message. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS may accept the negotiated QoS or may initiate the PDP context deactivation procedure. Upon receipt of the message ACTIVATE PDP CONTEXT ACCEPT the MS shall stop timer T3380, shall enter the state PDP-ACTIVE and shall initiate establishment of the logical link with the offered QoS if no logical link has been already established for that QoS.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

6.1.3.1.2 Successful PDP context activation requested by the network

In order to request a PDP context activation, the network sends a REQUEST PDP CONTEXT ACTIVATION message to the MS and starts timer T3385.

Upon receipt of a REQUEST PDP CONTEXT ACTIVATION message, the MS shall then either initiate the PDP context activation procedure as described in the previous section or shall reject the activation request by sending a REQUEST PDP CONTEXT ACTIVATION REJECT message as described in section 6.1.3.1.4. The value of the reject cause IE of the REQUEST PDP CONTEXT ACTIVATION REJECT message shall then indicate "activation rejected".

The ACTIVATE PDP CONTEXT REQUEST message sent by the MS in order to initiate the PDP context activation procedure shall contain the parameters requested by the network in the REQUEST PDP CONTEXT ACTIVATION message, except for the offered QoS which may be changed by the MS. This message shall also contain the PDP activation direction IE indicating "network requested PDP".

Upon receipt of the ACTIVATE PDP CONTEXT REQUEST message, the network shall stop timer T3385.

The same procedures apply as described for MS initiated PDP context activation.

6.1.3.1.3 Unsuccessful PDP context activation initiated by the MS

Upon receipt of an ACTIVATE PDP CONTEXT REQUEST message the network may reject the MS initiated PDP context activation by sending an ACTIVATE PDP CONTEXT REJECT message to the MS. The message shall contain a cause code that indicates either of the following causes:

- # 32: service option not supported;
- # 33: requested service option not subscribed;
- # 34: service option temporarily out of order;
- # 90 - 111: protocol errors.

Upon receipt of an ACTIVATE PDP CONTEXT REJECT message, the MS shall stop timer T3380.

6.1.3.1.4 Unsuccessful PDP context activation requested by the network

Upon receipt of the REQUEST PDP CONTEXT ACTIVATION message, the MS may reject the network requested PDP context activation by sending the REQUEST PDP CONTEXT ACTIVATION REJECT message to the network. The message shall contain all parameter of the REQUEST PDP CONTEXT ACTIVATION and an additional cause code that indicates either of the following causes:

- # 30: authentication failed;
- # 31: activation rejected;
- # 32: service option not supported;
- # 90 - 111: protocol errors.

The network shall stop timer T3385.

6.1.3.1.5 Abnormal cases

The following abnormal cases can be identified:

a) Expiry of timers

In the mobile station:

On the first expiry of the timer T3380, the MS shall resent the PDP CONTEXT ACTIVATION REQUEST and shall reset and restart timer T3380. This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3380, the MS shall release all resources possibly allocated for this invocation and shall abort the procedure; no automatic PDP context activation re-attempt shall be performed.

On the network side:

On the first expiry of the timer T3385, the network shall resent the message REQUEST PDP CONTEXT ACTIVATION and shall reset and restart timer T3385. This retransmission is repeated until the timer has

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

expired four times, i.e. on the fourth expiry of timer T3385, the network shall release possibly allocated resources for this activation and shall abort the procedure.

b) Collision of MS initiated and network requested PDP context activation

In the mobile station:

A collision of an MS initiated and a network requested PDP context activation procedure is identified by the MS if a REQUEST PDP CONTEXT ACTIVATION message is received from the network after the MS has sent a PDP CONTEXT ACTIVATION REQUEST message, and both messages contain the same APN and the MS has not yet received a PDP CONTEXT ACTIVATION ACCEPT or REJECT message.

On the network side:

A collision is detected by the network in case a PDP CONTEXT ACTIVATION REQUEST message is received from the MS - with the PDP activation direction IE indicating "MS initiated PDP" - as an answer to a REQUEST PDP CONTEXT ACTIVATION message sent to the MS.

In case of such a collision, the MS initiated PDP context activation shall take precedence over the network requested PDP context activation. The network shall abort the PDP context activation procedure and shall proceed with the MS initiated PDP context activation procedure by sending an ACTIVATE PDP CONTEXT ACCEPT message with the PDP activation direction IE indicating "MS initiated PDP". The MS shall discard the REQUEST PDP CONTEXT ACTIVATION message and shall wait for an ACTIVATE PDP CONTEXT ACCEPT message.

c) MS initiated PDP context activation for an already activated PDP context

On the network side:

If all parameters of the new PDP CONTEXT ACTIVATION REQUEST message match the parameters of the activated PDP context, the network shall reply with a PDP CONTEXT ACTIVATION ACCEPT message.

Otherwise the network shall reject the activation request.

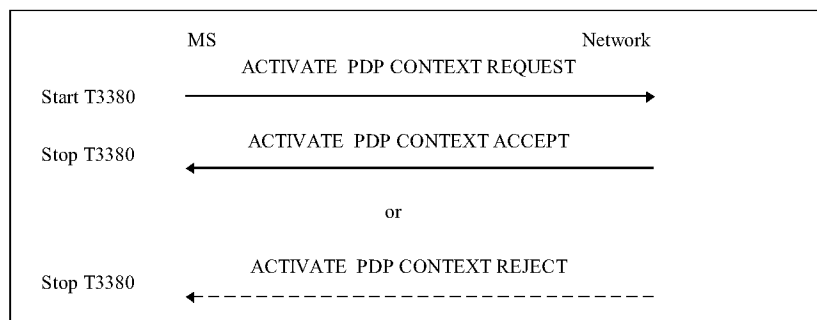


Figure 6.3/GSM 0408: MS initiated PDP context activation procedure

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

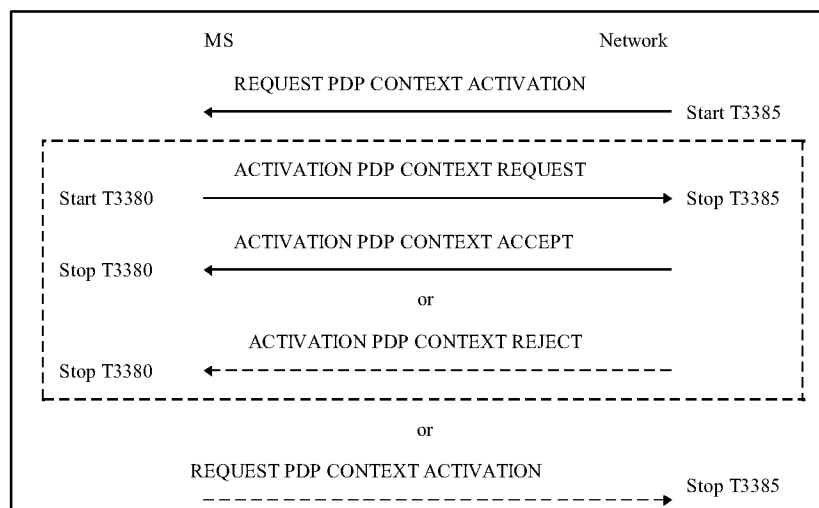


Figure 6.4/GSM 0408: Network initiated PDP context activation procedure

6.1.3.2 PDP context modification procedure

The PDP context modification procedure may be invoked by the network in order to change the QoS negotiated during the PDP context activation procedure or at previously performed PDP context modification procedures. The procedure may be initiated by the network only during an inter-SGSN routing area updating procedure when a PDP context is active.

In order to initiate the procedure, the network sends the message MODIFY PDP CONTEXT REQUEST message to the MS and starts timer T3386. The message shall contain a NSAPI and the new QoS for that NSAPI.

Upon receipt of this message the MS shall reply with the MODIFY PDP CONTEXT ACCEPT message, if the MS accepts the new QoS.

If the MS does not accept the new QoS, the MS shall initiate the PDP context deactivation procedure for the NSAPI that has been indicated in the message MODIFY PDP CONTEXT REQUEST - the reject cause IE value of the DEACTIVATE PDP CONTEXT REQUEST message shall indicate "QoS not accepted".

The network shall upon receipt of the MODIFY PDP CONTEXT ACCEPT message stop the timer T3386 and shall establish the logical link with the new QoS for the NSAPI indicated in the message MODIFY PDP CONTEXT REQUEST.

6.1.3.2.1 Abnormal cases

On the first expiry of timer T3386, the network shall resent the MODIFY PDP CONTEXT REQUEST message and reset timer T3386. This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3386, the network may continue to use the previously negotiated QoS or may initiate the PDP context deactivation procedure.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

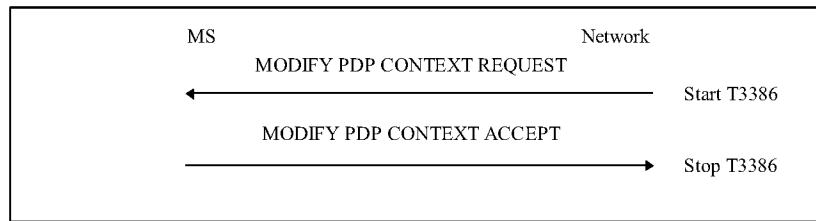


Figure 6.5/GSM 0408: PDP context modification procedure

6.1.3.3 PDP context deactivation procedure

The purpose of this procedure is to deactivate an existing PDP context between the MS and the network. The PDP context deactivation may be initiated by the MS or by the network.

6.1.3.3.1 PDP context deactivation initiated by the MS

In order to deactivate a PDP context, the MS sends a DEACTIVATE PDP CONTEXT REQUEST message to the network, enters the state PDP-INACTIVE-PEND and starts timer T3390. The message shall contain the NSAPI in use for the PDP context to be deactivated. After sending the message the MS shall initiate the release of the logical link if it is not used by another PDP context.

The network shall reply with the DEACTIVATE PDP CONTEXT ACCEPT message after the logical link has been released. Upon receipt of the DEACTIVATE PDP CONTEXT ACCEPT message, the MS shall stop timer T3390.

6.1.3.3.2 PDP context deactivation initiated by the network

In order to deactivate a PDP context, the network sends a DEACTIVATE PDP CONTEXT REQUEST message to the MS and starts timer T3395. The message shall contain the NSAPI in use for the PDP context to be deactivated. After sending the message the network shall initiate the release of the logical link if it is not used by another PDP context.

The MS shall, upon receipt of this message, reply with a DEACTIVATE PDP CONTEXT ACCEPT message after the logical link has been released. Upon receipt of the DEACTIVATE PDP CONTEXT ACCEPT message, the network shall stop the timer T3395.

6.1.3.3.3 Abnormal cases

The following abnormal cases can be identified:

a) Expiry of timers

In the mobile station:

On the first expiry of timer T3390, the MS shall resent the message DEACTIVATE PDP CONTEXT REQUEST and shall reset and restart the timer T3390. This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3390, the MS shall release all resources allocated and shall erase the PDP context related data.

On the network side:

On the first expiry of timer T3395, the network shall resent the message DEACTIVATE PDP CONTEXT REQUEST and shall reset and restart timer T3395. This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3395, the network erase the PDP context related data for that MS.

b) Collision of MS and network initiated PDP context deactivation requests

If the MS and the network initiated PDP context deactivation requests collide, the MS and the network shall each reply with the messages DEACTIVATE PDP CONTEXT ACCEPT and shall stop timer T3390 and T3395, respectively.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

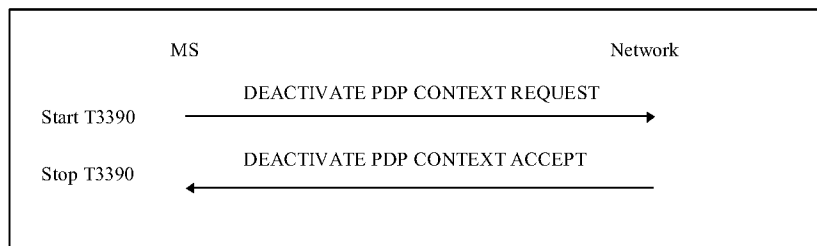


Figure 6.6/GSM 0408: MS initiated PDP context deactivation procedure

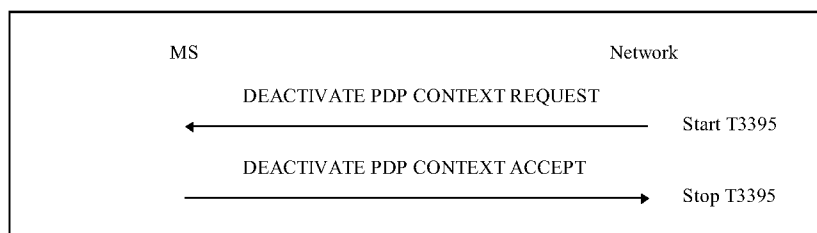


Figure 6.7/GSM 0408: Network initiated PDP context deactivation procedure

6.1.3.4 AA PDP context activation

The purpose of this procedure is to anonymously establish a PDP context between the MS and the network for a specific QoS on a specific NSAPI. The AA PDP context activation shall only be initiated by the MS.

6.1.3.4.1 Successful AA PDP context activation initiated by the mobile station

In order to activate an anonymous PDP context, the MS sends an ACTIVATE AA PDP CONTEXT REQUEST message to the network, enters the state PDP-ACTIVE-PEND and starts timer T3380. Until a P-TMSI is allocated to the MS, a random P-TMSI is used for addressing on lower layers.

The network shall reply with the ACTIVATE AA PDP CONTEXT ACCEPT message. The message shall contain a P-TMSI allocated by the network. The receipt of the P-TMSI is not confirmed by the MS. If the offered QoS parameters received from the network differ from the QoS requested by the MS, the MS shall accept the QoS offered by the network. Upon receipt of the message ACTIVATE AA PDP CONTEXT ACCEPT, the MS shall stop timer T3380, shall enter the state PDP-ACTIVE and shall initiate establishment of the logical link with the negotiated QoS.

The AA-READY timer value may be negotiated between the MS and the network as described in section 4.7.11. The AA-READY timer shall be started in the GMM-AA entity. The AA-READY timer shall be reset and restarted by the MS when an indication is received from lower layers that data has been sent. It shall be reset and restarted by the network when an indication is received from lower layers that data has been received. When the AA-READY timer expires, the AA PDP context is implicitly deactivated, i.e. it is deleted.

6.1.3.4.2 Unsuccessful AA PDP context activation

Upon receipt of the ACTIVATE AA PDP CONTEXT REQUEST message the network may indicate the failure of the MS initiated AA PDP context activation by sending the ACTIVATE AA PDP CONTEXT REJECT message to the MS. The message shall contain a cause code that indicates either of the following causes:

- # 32: service option not supported;
- # 34: service option temporarily out of order;
- # 90 - 111: protocol errors.

The MS shall stop the timer T3380.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

6.1.3.4.3 Abnormal cases

a) Expiry of timers

On the first expiry of timer T3380, the MS shall resend the ACTIVATE AA PDP CONTEXT REQUEST and shall reset and restart timer T3380.

This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3380, the MS shall indicate the failure of the AA PDP context activation procedure to the register functions, shall release all resources possibly allocated for this invocation and shall abort the procedure; no automatic AA PDP context activation re-attempt shall be performed.

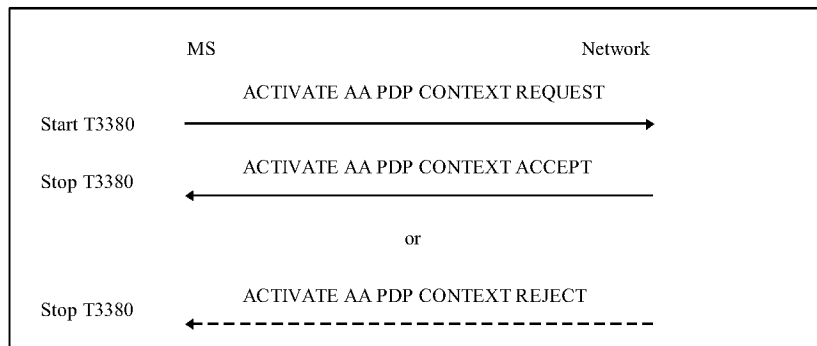


Figure 6.8 GSM 0408: MS initiated AA PDP context activation procedure

6.1.3.5 AA PDP context deactivation

6.1.3.5.1 Implicit AA PDP context deactivation

The implicit deactivation is performed without signalling message exchange as specified below.

The AA PDP context on the network side shall be deactivated when:

- the READY timer expires in the GMM-AA entity.

The AA PDP context in the MS shall be deactivated when:

- the READY timer expires in the GMM-AA entity; or
- the MS changes the routing area; or
- user requested.

6.1.3.5.2 Explicit AA PDP context deactivation

An explicit AA PDP context deactivation shall only be initiated by the network. The procedure shall be performed when a misuse of the anonymous PDP context has been detected.

In order to deactivate the AA PDP context, the network sends the message DEACTIVATE AA PDP CONTEXT REQUEST and starts timer T3397. The message shall contain the NSAPI in use for the AA PDP context to be deactivated. After sending the message the network initiates the release of the logical link.

The MS shall, upon receipt of this message, reply with the DEACTIVATE AA PDP CONTEXT ACCEPT message after the logical link has been released.

Upon receipt of the DEACTIVATE AA PDP CONTEXT ACCEPT message, the network shall stop the timer T3397.

Error! Use the Home tab to apply ZGSM to the text that you want to appear here.

GSM 04.08 V6.0.0 (1998-04)

6.1.3.5.3 Abnormal cases

a) Expiry of timers

On the first expiry of timer T3397, the network shall resent the message DEACTIVATE AA PDP CONTEXT REQUEST and shall reset and restart timer T3397.

This retransmission is repeated until the timer has expired four times, i.e. on the fourth expiry of timer T3397, the network shall release all resources allocated for that MS and shall erase the AA PDP context related data for that MS.

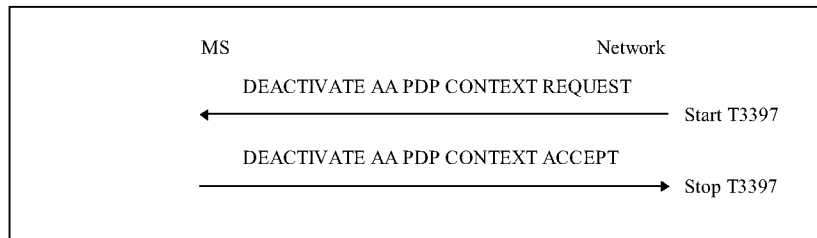


Figure 6.9/GSM 0408: Network initiated AA PDP context deactivation procedure

b) Lower layer failure

If a lower layer failure is indicated before the DEACTIVATE AA PDP CONTEXT ACCEPT message is received, the MS shall abort the procedure and shall locally de-allocate the P-TMSI from the LLC sublayer.

If a lower layer failure is indicated before the DEACTIVATE AA PDP CONTEXT ACCEPT message is received, the network shall abort the procedure and shall locally de-allocate the P-TMSI from the LLC sublayer.7 Examples of structured procedures

Section 7 is non-normative.

7.1 General

Section 7 contains examples of how the network may group together the elementary procedures (i.e. the procedures defined in sections 3 to 5) in order to provide normal service.

The layer 3 signalling at the radio interface may be divided into so-called structured procedures which consist of specific combinations of elementary procedures. In section 7.3, selected examples of structured procedures are described. A structured procedure consists of (not necessarily all) components shown in figure 7.1. These components are characterized by the purpose of their use in structured procedures and their message flow in the following sections 7.1.1 to 7.1.7.